UNITED STATES COAST PILOT

ALASKA

PART I

DIXON ENTRANCE TO YAKUTAT BAY

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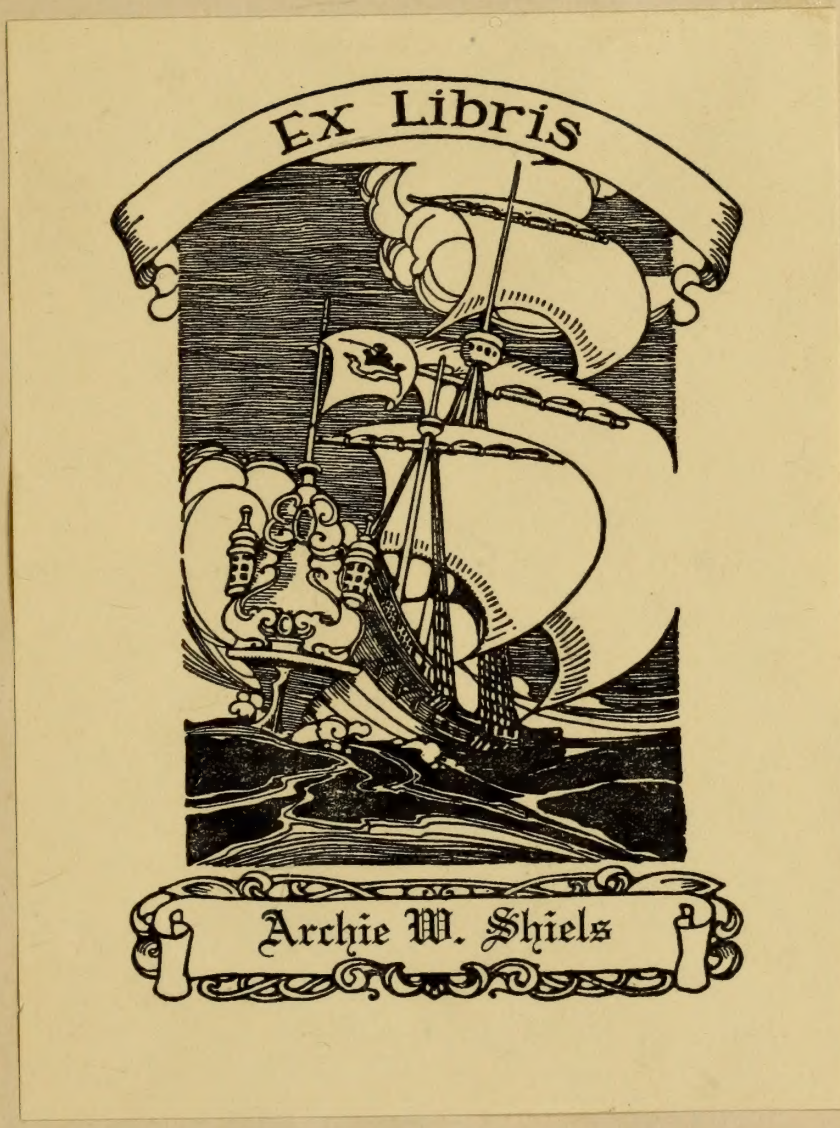

Serial No. 66

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
E. LESTER JONES, SUPERINTENDENT

UNITED STATES COAST PILOT

ALASKA

PART I

DIXON ENTRANCE TO YAKUTAT BAY

SIXTH EDITION

PRICE, 50 CENTS

WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

DEPARTMENT OF COMMERCE,
U. S. COAST AND GEODETIC SURVEY,
Washington. D. C., June 29, 1917.

This publication covers the coast and inland passages of Alaska from Dixon Entrance to Yakutat Bay, and includes courses and distances for the inland passage through British Columbia used by steam vessels to reach the waters of southeastern Alaska. It is based mainly upon the work of the United States Coast and Geodetic Survey, including the results of special examinations in 1916.

The first edition of the "Coast Pilot of Alaska from Southern Boundary to Cooks Inlet" was prepared by George Davidson and published in 1869. In the fourth edition the title, arrangement, and text were changed by Herbert C. Graves and Pilot E. H. Francis and published in 1901. The present (sixth) edition has been prepared by Arthur J. Ela, jr., hydrographic and geodetic engineer, Coast and Geodetic Survey.

Great courtesy has been shown by the Lighthouse Service and local authorities in furnishing information for use in this publication.

The aids to navigation are corrected to June 29, 1917.

Navigators are requested to notify the Superintendent of the Coast and Geodetic Survey of any errors or omissions they may find in this publication, or of additional matter which they think should be inserted for the information of mariners.

E. LESTER JONES,
Superintendent.

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NOTE.

The courses and bearings given in degrees are *true*, reading clockwise from 0° at north to 360°, and are followed by the equivalent *magnetic* value in points in parentheses. General directions, such as northeastward, west-southwestward, etc., are magnetic.

Distances are in *nautical miles*, and may be converted approximately to statute miles by adding 15 per cent to the distances given.

Currents are expressed in knots, which are nautical miles per hour.

All depths are at *mean lower low water*, except in Wrangell Narrows, where they are at 3 feet below mean lower low water.

Supplements and other corrections for this volume are issued from time to time, and will be furnished, free of charge, on application to the United States Coast and Geodetic Survey, Washington, D. C., provided the volume itself has not been superseded by a subsequent edition.

UNITED STATES COAST PILOT.

ALASKA—PART I—DIXON ENTRANCE TO YAKUTAT BAY.

NAVIGATIONAL AIDS AND THE USE OF CHARTS.

The Coast and Geodetic Survey is charged with the survey of the coasts, harbors, and tidal estuaries of the United States and its insular possessions and issues the following publications relating to these waters as guides to navigation: Charts, Coast Pilots, Tide Tables, a catalogue of these publications, and Notice to Mariners, the last named published weekly by the Bureau of Lighthouses and Coast and Geodetic Survey.

Charts bear three dates which should be understood by persons using them—(1) the date (month and year) of the edition, printed on the late charts below the border in a central position and on the older ones on the face of the chart; (2) the date of the latest correction to the chart plate, printed in the lower left-hand corner below the border; (3) *the date of issue, stamped* below the border and just to the left of the subtitle.

Charts show all necessary corrections as to lights, beacons, buoys, and dangers, which have been received to the *date of issue*, being hand corrected since the latest date printed in the lower left-hand corner. All small but important corrections occurring subsequent to the date of issue of the chart are published in Notices to Mariners, and should be applied by hand to the chart immediately after the receipt of the notices.

The date of the edition of the chart remains unchanged until an extensive correction is made on the plate from which the chart is printed. The date is then changed and the issue is known as a new edition.

When a correction, not of sufficient importance to require a new edition, is made to a chart plate, the year, month, and day are noted in the lower left-hand corner.

All the notes on a chart should be read carefully, as in some cases they relate to the aids to navigation or to dangers that can not be clearly charted.

The charts are various in character, according to the objects which they are designed to subserve. The most important distinctions are the following:

1. Sailing charts, mostly on a scale of approximately $\frac{1}{1200000}$, which exhibit the approaches to a large extent of coast, give the offshore soundings, and enable the navigator to identify his position as he approaches from the open sea.

2. General charts of the coast, on scales of $\frac{1}{400000}$ and $\frac{1}{200000}$ intended especially for coastwise navigation.

3. Coast charts, on a scale of $\frac{1}{80000}$, by means of which the navigator is enabled to avail himself of the channels for entering the larger bays and harbors.

4. Harbor charts, on larger scales, intended to meet the needs of local navigation.

Coast Pilots, relating to the surveyed waters of the United States, Porto Rico, and a part of Alaska, and Sailing Directions of the Philippine Islands, contain full nautical descriptions of the coast, harbors, dangers, and directions for coasting and entering harbors. Similar information relating to parts of Alaska and Hawaii is published in Coast Pilot Notes.

Coast Pilots are corrected for important information received to the date of issue, which is stamped on the correction sheets accompanying the volume. From time to time, as the material accumulates, supplements are issued containing the more important corrections since the publication of the volume. The supplements are printed on one side of the paper only, so that they may be cut and pasted in the appropriate places in the volume. Supplements and other corrections for any volume can be furnished free of charge on application to the Coast and Geodetic Survey, Washington, D. C., provided the volume itself has not been superseded by a subsequent edition.

Tide Tables.—The Coast and Geodetic Survey Tide Tables are issued annually in advance of the year for which they are made, and contain the predicted time and height of the tides for each day in the year at the principal ports of the world, including the United States and its possessions. A table of tidal differences is given, by means of which the tides at more than 3,000 intermediate ports may be obtained. Separate reprints from the general Tide Tables are issued for the Atlantic and Pacific coasts of the United States and its dependencies.

Agencies for the sale of the Charts, Coast Pilots, and Tide Tables of the Coast and Geodetic Survey are established in many ports of the United States and in some foreign ports. They can also be purchased in the office of the Coast and Geodetic Survey, Washington, D. C., or any of the suboffices. If ordered by mail, prepayment is obligatory. Remittances should be made by postal money order or express order, payable to the "Coast and Geodetic Survey." Postage stamps, checks, and drafts can not be accepted. The sending of money in an unregistered letter is unsafe. Only catologue numbers of charts need be mentioned. The catologue of charts and other publications of the Survey can be obtained free of charge on application at any of the sale agencies or to the Coast and Geodetic Survey Office, Washington, D. C.

Other Publications.—Lists of Lights, Buoys, and other Daymarks of the United States, its insular possessions, and the Great Lakes, are published by the Bureau of Lighthouses. Notice to Mariners, relating to the same waters, are published weekly by the Bureau of Lighthouses and Coast and Geodetic Survey. These publications can be obtained free of charge on application to the Division of Publications, Department of Commerce, Washington, D. C.

ACCURACY OF CHART.—The value of a chart depends upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become. In these respects the source from which the information has been compiled is a good guide.

This applies particularly to the charts of the Alaska Peninsula, Aleutian Islands, Arctic Ocean, and part of Bering Sea and the Philippine Islands. The early Russian and Spanish surveys were not made with great accuracy, and until they are replaced by later surveys these charts must be used with caution.

With respect to these regions the fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed it may be taken for granted that the survey was not in great detail.

A wide berth should therefore be given to every rocky shore or patch, and this rule should invariably be followed, viz, that instead of considering a coast to be clear unless it is shown to be foul, the contrary should be assumed.

With respect to a well-surveyed coast only a fractional part of the soundings obtained are shown on the chart, a sufficient number being selected to clearly indicate the contour of the bottom. When the bottom is uneven the soundings will be found grouped closely together, and when the slopes are gradual fewer soundings are given. Each sounding represents an actual measure of depth and location at the time the survey was made.

Shores and shoals where sand and mud prevail, and especially bar harbors and the entrances of bays and rivers exposed to strong tidal currents and a heavy sea, are subject to continual change of a greater or less extent, and important ones may have taken place since the date of the last survey. In localities which are noted for frequent and radical changes, such as the entrance to a number of estuaries on the Atlantic, Gulf, and Pacific coasts, notes are printed on the charts calling attention to the fact.

It should also be remembered that in coral regions and where rocks abound it is always possible that a survey with lead and line, however detailed, may have failed to find every small obstruction. For these reasons when navigating such waters the customary sailing lines and channels should be followed, and those areas avoided where the irregular and sudden changes in depth indicate conditions which are associated with pinnacle rocks or coral heads.

DREDGED CHANNELS.—These are generally shown on the chart by two broken lines to represent the side limits of the improvement. Before completion of the project the depth given is that shown by the latest survey received from the engineer in charge. After completion the depth given is the one proposed to be maintained by redredging when necessary.

The actual depth of a completed channel may be greater than the charted depth shortly after dredging, and less when shoaling occurs as a result of storms or other causes. These changes are of too frequent occurrence and uncertain duration to chart. Therefore when a vessel's draft approximates the charted depth of a dredged channel, the latest information should be obtained before entering.

Danger Curves.—The curves of depth will be found useful in giving greater prominence to outlying dangers. It is a good plan to trace out with a colored pencil the curve next greater than the draft of the vessel using the chart, and regard this as a "danger curve," which is not to be crossed without precaution.

Isolated soundings shoaler than surrounding depths should be avoided, as there is always the possibility that the shoalest spot may not have been found.

Caution in Using Small-Scale Charts.—It is obvious that dangers to navigation can not be shown with the same amount of detail on small-scale charts as on those of larger scale; therefore in approaching the land or dangerous banks regard should be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile.

For the same reason, bearings to near objects should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

Distortion of Printed Charts.—The paper on which charts are printed has to be dampened. On drying, distortion takes place from the inequalities in the paper, which varies with the paper and the amount of the original dampening; but it is not sufficient to affect ordinary navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted upon the chart, especially if the lines to objects be long. The larger the chart the greater the amount of this distortion.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact position, especially when in exposed positions; it is safer, when possible, to navigate by bearings or angles to fixed objects on shore and by the use of soundings.

Gas buoys and other unwatched lights can not be implicitly relied on; the light may be altogether extinguished, or, if intermittent, the apparatus may get out of order.

Lights.—The distances given in the light lists and on the charts for the visibility of lights are computed for a height of 15 feet for the observer's eye. The table of distances of visibility due to height, published in the light list, affords a means of ascertaining the effect of a greater or less height of the eye. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking for a light the fact may be forgotten that from aloft the range of vision is increased. By noting a star immediately over the light a bearing may be afterwards obtained from the standard compass.

The actual power of a light should be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by its candlepower as given in the light lists and in some cases by noting how much its visibility

in clear weather falls short of the range due to the height at which it is placed. Thus a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Fog Signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the wind, large areas of silence have been found in different directions and at different distances from the origin of the sound signal, even in clear weather. Therefore too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal may require some time before it is in readiness to act. A fog often creeps imperceptibly toward the land and is not observed by those at a lighthouse until it is upon them, whereas a vessel may have been in it for many hours while approaching the land. In such a case no signal may be sounded. When sound travels against the wind, it may be thrown upward; in such a case a man aloft might hear it when it is inaudible on deck. The conditions for hearing a signal will vary at the same station within short intervals of time; mariners must not, therefore, judge their distance from a fog signal by the force of the sound and must not assume that a signal is not sounding because they do not hear it.

Taken together, these facts should induce the utmost caution when nearing the land or danger in fog. The lead is generally the only safe guide and should be faithfully used.

Submarine Bells have an effective range of audibility greater than signals sounded in air, and a vessel equipped with receiving apparatus can determine the approximate bearing of the signal. These signals can be heard also on vessels not equipped with receiving apparatus by observers below the water line, but a bearing of the signal can not then be readily determined.

Tides.—A knowledge of the tide, or vertical rise and fall of the water, is of great and direct importance whenever the depth at low water approximates to or is less than the draft of the vessel and wherever docks are constructed so as to be entered and left near the time of high water. But under all conditions such knowledge may be of indirect use, as it often enables the mariner to estimate in advance whether at a given time and place the current will be running flood or ebb. In using the tables slack water should not be confounded with high or low tide nor a flood or ebb current with flood or ebb tide. In some localities the rise or fall may be at a stand while the current is at its maximum velocity.

The Tide Tables published by the Coast and Geodetic Survey give the predicted times and heights of high and low waters for most of the principal ports of the world and tidal differences and constants for obtaining the tides at all important ports.

Plane of Reference for Soundings on Charts.—For the Atlantic coast of the United States and Porto Rico the plane of reference for soundings is the mean of all low waters; for the Pacific coast of the United States and Alaska, with the two exceptions noted below, and for the Hawaiian and Philippine Islands, it is the mean of the lower low waters. For Puget Sound, Wash., the plane of reference is 2 feet below mean lower low water and for Wrangell Narrows, Alaska, it is 3 feet below mean lower low water.

For the Atlantic coast of the Canal Zone, Panama, the plane of reference for soundings is mean low water, and for the Pacific coast of the same it is low-water springs.

For foreign charts many different planes of reference are in use, but that most frequently adopted is low-water springs.

It should be remembered that whatever plane of reference is used for a chart there may be times when the tide falls below it. When the plane is mean low water or mean lower low water there will generally be as many low waters or lower low waters below those planes as above them. Also the wind may at times cause the water to fall below the plane of reference.

Tidal Currents.—In navigating coasts where the tidal range is considerable special caution is necessary. It should be remembered that there are indrafts into all bays and bights, although the general set of the current is parallel to the shore.

The turn of the tidal current offshore is seldom coincident with the time of high and low water on the shore.

At the entrance to most harbors without important tributaries or branches the current turns at or soon after the times of high and low water within. The diurnal inequality in the velocity of current will be proportionately but half as great as in the height of the tides. Hence, though the heights of the tide may be such as to cause the surface of the water to vary but little in level for 10 or 12 hours, the ebb and flow will be much more regular in occurrence.

A swift current often occurs in narrow openings between two bodies of water, because the water at a given instant may be at different levels.

Along most shores not seriously affected by bays, tidal rivers, etc., the current usually turns soon after high and low waters.

Where there is a large tidal basin with a narrow entrance, the strength of the current in the entrance may occur near the time of high and low water, and slack water at about half tide, outside.

The swiftest current in straight portions of tidal rivers is usually in the mid-channels, but in curved portions the strongest current is toward the outer edge of the curve.

Counter currents and eddies may occur near the shores of straits, especially in bights and near points.

Tide Rips and Swirls occur in places where strong currents occur, caused by a change in the direction of the current and especially over shoals or in places where the bottom is uneven. Such places should be avoided if exposed also to a heavy sea, especially with the wind opposing the current; when these conditions are at their worst the water is broken into heavy choppy seas from all directions, which board the vessel, and also make it difficult to keep control, owing to the baring of the propeller and rudder.

Current Arrows on charts show only the usual or mean direction of a tidal stream or current. It must not be assumed that the direction of the current will not vary from that indicated by the arrow. In the same manner, the velocity of the current constantly varies with circumstances, and the rate given on the chart is a mean value, corresponding to an average range of tide. At some stations but few observations have been made.

Fixing Position.—The most accurate method available to the navigator of fixing a position relative to the shore is by plotting with

a protractor sextant angles between well-defined objects on the chart; this method, based on the "three-point problem" of geometry, should be in general use.

In many narrow waters, also, where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by its means. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might under such circumstances put the ship ashore.

For its successful employment it is necessary: First, that the objects be well chosen; and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn.

On the other hand, distant objects should be used for direction because less affected by a small error or change of position.

The three-arm protractor consists of a graduated circle with one fixed and two movable radial arms. The zero of the graduation is at the fixed arm and by turning the movable arms each one can be set at any desired angle with reference to the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges in case of a metal instrument, or the radial lines in the case of a transparent or celluloid instrument, pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole.

The tracing-paper protractor, consisting of a graduated circle printed on tracing paper, can be used as a substitute for the brass or celluloid instrument. The paper protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The value of a determination depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through the three objects it will be indeterminate, as it will plot all around the circle. An approach to this condition, which is called a revolver, must be avoided. In case of doubt select from the chart three objects nearly in a straight line, or with the middle object nearest the observer. Near objects are better than distant ones, and, in general, up to 90° the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer, the angle that changes less rapidly

may be observed both before and after the other angle and the proper value obtained by interpolation.

A single angle and a range give in general an excellent fix, easily obtained and plotted.

The Compass.—It is not intended that the use of the compass to fix the position should be given up; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. Where accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal, or of additions to a chart, as fresh soundings or new buildings. In such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained prevent any errors.

When only two objects are visible, a sextant angle can be used to advantage with the compass bearings and a better fix obtained than by two bearings alone.

Doubling the Angle on the Bow.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing," the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy, and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam before the position is obtained.

By taking the bearings at two points and four points on the bow, a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current. Taking afterwards the beam bearing gives, with slight additional trouble, the distance of the object when abeam; such beam bearings and distances, with the times, should be continuously recorded as fresh departures, the importance of which will be appreciated in cases of being suddenly shut in by fog.

A graphic solution of the problem for any two bearings of the same object is frequently used. The two bearings are drawn on the chart, and the course is then drawn by means of the parallel rulers so that the distance measured from the chart between the lines is equal to the distance made good by the vessel between the times of taking the bearings.

Danger Angle.—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten. In employing the horizontal danger angle, however, charts compiled from early Russian and Spanish sources, referred to in a preceding paragraph, should not be used.

Soundings.—In thick weather, when near or approaching the land or danger, soundings should be taken continuously and at regular intervals and, with the character of the bottom, systematically recorded. By marking the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship, and then moving the paper over the chart parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined.

Sumner's Method.—Among astronomical methods of fixing a ship's position the great utility of Sumner's method should be well

understood, and this method should be in constant use. The Sumner line—that is, the line drawn through the two positions obtained by working the chronometer observation for longitude with two assumed latitudes, or by drawing through the position obtained with one latitude a line at right angles to the bearing of the body as obtained from the azimuth tables—gives at times invaluable information, as the ship must be somewhere on that line, provided the chronometer is correct. If directed toward the coast, it marks the bearing of a definite point; if parallel with the coast, the distance of the latter is shown. Thus the direction of the line may often be usefully taken as a course. A sounding at the same time with the observation may often give an approximate position on the line. A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The Sumner lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterwards or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day and in combination with the sun gives an excellent fix.

Change of Variation of the Compass.—The gradual change in the variation must not be forgotten in laying down positions by bearings on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long, the displacement of position from neglect of this change may be of importance. The compasses are reengraved for every new edition if the error is appreciable. Means for determining the amount of this error are provided by printing the date of constructing the compass and the annual change in variation near its edge.

The change in the magnetic variation in passing along some parts of the coast of the United States is so rapid as to materially affect the course of a vessel unless given constant attention. This is particularly the case in New England and parts of Alaska, where the lines of equal magnetic variation are close together and show rapid changes in magnetic variation from place to place, as indicated by the large differences in variation given on neighboring compass roses.

Local Magnetic Disturbance.—The term "local magnetic disturbance" or "local attraction" has reference only to the effects on the compass of magnetic masses external to the ship. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places.

Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centers near together.

The law which has hitherto been found to hold good as regards local magnetic disturbances is, that north of the magnetic equator the north end of the compass needle is attracted toward any center of disturbance; south of the magnetic equator it is repelled.

It is very desirable that whenever an area of local magnetic disturbance is noted, the position should be fixed, and the facts reported as far as they can be ascertained.

Use of Oil for Modifying the Effect of Breaking Waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil skillfully applied may prevent much damage both to ships (especially of the smaller classes) and to boats by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:

1. On free waves, i. e., waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances, but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing else is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, either when running or lying-to, or in wearing.

6. No experiences are related of its use when hoisting a boat at sea or in a seaway, but it is highly probable that much time would be saved and injury to the boat avoided by its use on such occasions.

7. In cold water the oil, being thickened by the lower temperature and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags, capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to facilitate leakage of the oil. The oil is also frequently distributed from canvas bags or oakum inserted in the closet bowls.

The positions of these bags should vary with the circumstances. Running before the wind, they should be hung on either bow—e. g., from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying-to, the weather bow, and another position farther aft, seem the best places from which to hang the bags, using sufficient line to permit them to draw to windward while the ship drifts.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect can not be so much trusted.

On a bar, with the ebb tide running, it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat and the bag readily hauled on board for refilling, if necessary.


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COAST AND GEODETIC SURVEY CHARTS
SOUTHEAST ALASKA
1917
BRITISH COLUMBIA
A L A S K A
PACIFIC OCEAN
Skagway
Taiya Inlet
Chilkoot Inlet
Haines
Chilkat River
Chilkat Inlet
Pt Sherman
Barners Bay
Pt Bridget
LYNN CANAL
Douglas and Treadwell
Thane
Juneau
Gastineau Chl
Douglas I.
STEPHENS
PASSAGE
Taku Inlet
Port Snettisham
Slocum Inlet
Holkham Bay
Windham Pt.
Windham Bay
Hobart Bay
ADMIRALTY I.
Seymour Canal
Windfall Hbr
Mole Hbr
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Sail I.
Fanshaw B.
FREDERICK SOUND
Thomas Bay
Farragut Bay
Petersburg
LINDENBERG
PENINSULA
Portage Bay
Wrangell Narrows
MITKOF I.
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Keku Strait
Pybus Bay
Killisnoo
Chaik Bay
Whitewater Bay
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Herring Bay
GLACIER BAY
ICY STRAIT
Port Frederick
Tenakee Inlet
CHICHAGOF I.
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Peril Strait
CHATHAM STRAIT
Kelp B.
Takatz Bay
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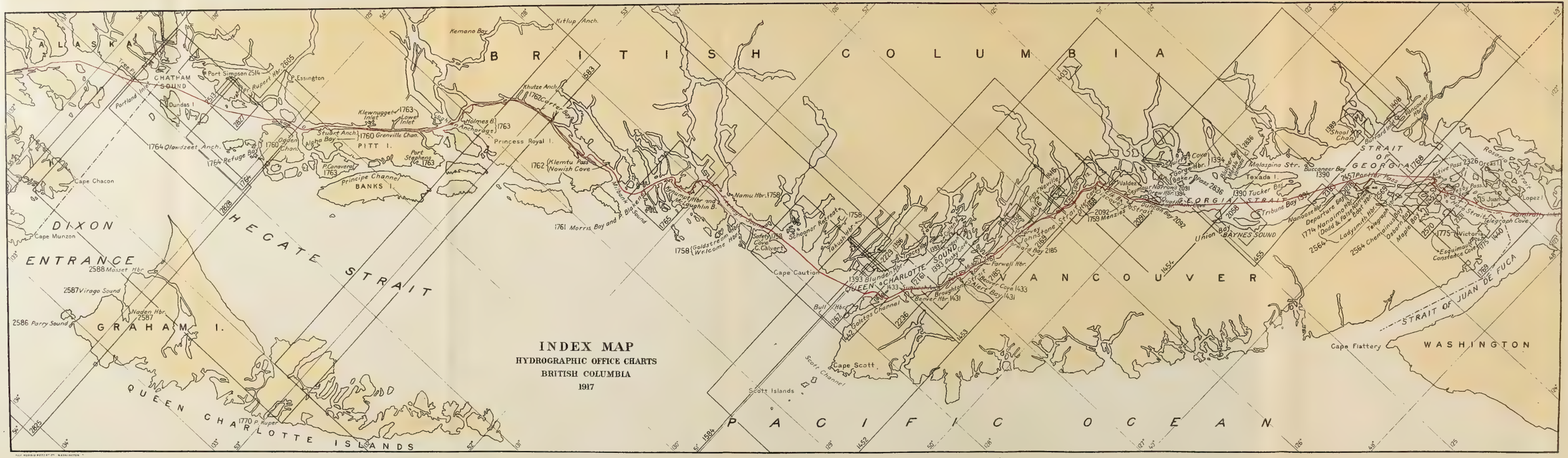
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COURSES AND DISTANCES FROM SEATTLE TO SKAGWAY AND YAKUTAT.

The waters within the limits of the United States and Alaska are shown on charts issued by the Coast and Geodetic Survey, and within the limits of British Columbia are shown on charts issued by the Hydrographic Office. The waters of southeastern Alaska are shown on Coast and Geodetic Survey chart 8002, scale $\frac{1}{1000000}$; and in parts on Coast and Geodetic Survey charts 8100, 8150, 8200, 8250, and 8300, scale of each $\frac{1}{200000}$; price of each $0.50. Portions of these waters are shown more in detail on harbor charts, as noted under the several headings, and on the index charts accompanying this volume.

Caution.—When navigating the inside waters of British Columbia, it should be constantly borne in mind that many of the main channels and most of the minor passages have been only roughly examined; detached bowlders from the broken shores and pinnacles of rock are still frequently found. Parts of the inside passage through southeastern Alaska have been examined by means of a wire drag, and the limits of the channels so examined are mentioned in the descriptions. Channels which have not been so examined should be navigated with caution. Whenever a broad and clear channel is known to exist there is no justification in using, without necessity, one of a more doubtful character, even if there be some saving in distance; and a ship should always be kept in the safest possible position in a channel, as well as when going in or out of port.

The courses given in the following table have been used by vessels of various sizes for several years and will be found dependable if used judiciously in connection with the charts. All bearings given in the first (descriptive) column of the table are magnetic. Unless otherwise stated the courses in the second and third columns lead to positions with the objects abeam.

	Course.		Distance in nautical miles.	Distance from Seattle in nautical miles.
	True.	Magnetic.		
SEATTLE TO ACTIVE PASS, B. C.	°			
1. Seattle to Four Mile Rock bearing NE by N, distant ½ mile.	300	W ½ N.....	4	4
2. To West Point lighthouse, ½ mile off.....	328	NW by W.....	1½	6
3. To Apple Cove Point, 1⅜ miles off.....	359	NNW ¼ W.....	9⅜	15
4. To Point-No-Point lighthouse, ¾ mile off...	339	NW.....	6⅝	22
5. To Double Bluff, 1⅛ miles off.....	315	WNW ⅛ W....	3¼	25
6. To Bush Point light, ½ mile off.....	334	NW ½ W.....	4⅞	30

	Course.		Distance in nautical miles.	Distance from Seattle in nautical miles.
	True.	Magnetic.		
SEATTLE TO ACTIVE PASS, B. C.—continued.				
7. To Marrowstone Point lighthouse, ½ mile off.	° 334	NW ½ W.....	5⅛	35
8. To Point Wilson lighthouse, ½ mile off....	313	WNW ⅜ W....	3⅞	39
9. To Lime Kiln light, 1½ miles off.....	320	NW by W ¾ W	27½	66
Course leads 1⅜ miles southwestward of Partridge Bank buoy and 1⅝ miles northeastward of Hein Bank buoy.				
10. To Turn Point lighthouse, ½ mile off.....	346	NW ½ N.....	11½	78
Course leads ⅜ mile southwestward of Henry Island.				
11. To Mouatt Point, ½ mile off.....	329	NW by W.....	6	84
12. To Portlock Point lighthouse, ⅜ mile off..	351	NW by N.....	3⅝	87
13. To Enterprise Reef beacon bearing E by N, distant ⅜ mile.	329	NW by W.....	1	88
ACTIVE PASS TO SEYMOUR NARROWS.				
14. To Helen Point light bearing SE by S, distant ¼ mile.	30	N ½ E.....	1	89
15. To Mary Ann Point lighthouse, bearing NW, distant ¼ mile.	99	ENE ⅝ E [1]....	1⅜	91
16. To Gossip Shoals buoy bearing SW, distant ½ mile.	21	N ⅜ W [1].....	2⅜	93
17. To Thrasher Rock light, 1 mile off.....	321	NW by W ¾ W.	21	114
18. To Entrance Island lighthouse, 1¼ miles off.	300	W ⅜ N.....	8	122
19. To Ballenas Islands lighthouse, 1 mile off..	300	.....do.....	16½	139
20. To Sea Egg Rocks, ⅞ mile off.....	300	.....do.....	8½	147
21. To ½ mile northward of Sisters lighthouse..	307	W by N.....	5⅛	152
Course leads ⅝ mile off the south point of Lasqueti Island.				
22. To Cape Lazo, 2⅝ miles off.....	315	WNW ¼ W....	21	173
23. To Cape Mudge lighthouse, ½ mile off.....	315	.....do.....	21¾	195
24. To Yaculta Village, ⅝ mile off.....	347	NW ½ N.....	1⅝	197
25. To Steep Island, highest point, ⅜ mile off..	332	NW ¾ W.....	3⅞	200
26. To Race Point, ¼ mile off.....	317	WNW ⅛ W....	3¼	203
27. To Maud Island light bearing N by W, distant ¼ mile.	299	W ¼ N.....	1⅜	205
SEYMOUR NARROWS TO QUEEN CHARLOTTE SOUND.				
28. To Chain Islands, ⅝ mile off.....	350	NW ¾ N.....	7⅝	213
Course leads 200 yards westward of Maud Island and 200 yards eastward of Ripple Rock. For currents see page 33.				
29. To Otter Point, ½ mile off.....	337	NW ⅜ W.....	1⅜	214
30. To Chatham Point light, bearing SW by W, distant ⅜ mile.	341	NW.....	4	218
31. To Rock Point beacon, ¼ mile off.....	280	WSW ½ W....	2¾	221
Course leads 400 yards southward of Siwash Rock buoy.				
32. To Ripple Point beacon, ¼ mile off.....	299	W ¼ N.....	3¼	224
33. To Vansittart beacon, ⅜ mile off.....	271	SW by W ¾ W	7⅛	231

[1] Approximately mid-channel course.

	Course.		Distance in nautical miles.	Distance from Seattle in nautical miles.
	True.	Magnetic.		
SEYMOUR NARROWS TO QUEEN CHARLOTTE SOUND—continued.	°			
34. To Camp Point, ¼ mile off. Course leads midway between Camp Point and Ripple Shoal.	291	W ½ S.	2½	234
35. To Helmcken Island light, ¼ mile off.	270	SW by W ⅝ W.	1⅞	236
36. To east point, Salmon River entrance, ¾ mile off.	287	W ¾ S.	2¾	238
37. To Milly Island bearing NNW, distant ¾ mile.	303	W ⅝ N.	7⅜	246
38. To Adams River bluff, ⅞ mile off.	281	WSW ⅝ W[1]	6	252
39. To Cracroft Island light, ⅞ mile off.	274	WSW [1]	12⅞	265
40. To 22-foot Islet, Bauza Cove, ⅝ mile off.	290	W ½ S [1]	9	274
41. To Gordon Point, ½ mile off.	279	WSW ½ W.	4¼	278
42. To Yellow Bluff, ¼ mile off.	298	W ⅛ N.	2	280
43. To position midway between Haddington Island and Haddington Reefs buoy.	298	do.	2⅝	282
44. To west end, Haddington Island, ⅜ mile off.	298	do.	⅜	283
45. To Pulteney Point lighthouse on Graeme Point, ⅜ mile off.	280	WSW ½ W.	5⅛	288
46. To Round Island, ¾ mile off	313	WNW ½ W.	10	298
47. To Masterman Island light, ½ mile off.	308	W by N.	3¼	301
48. To Noble Islets light bearing NNE, distant ½ mile.	292	W ⅜ S.	7⅝	309
49. To Scarlett Point lighthouse bearing SSW, distant ½ mile.	0	NNW ⅜ W [1]	3	312
50. To Pine Island lighthouse bearing NNE, distant ½ mile.	320	WNW.	8⅛	320
QUEEN CHARLOTTE SOUND TO MILBANK SOUND.				
51. To 1½ miles southwestward of Egg Island lighthouse. Course leads 1⅝ miles off Cape Caution.	343	NW ⅛ N.	16⅞	337
52. To Harold Point, 1 mile off.	5	NNW.	12½	349
53. To Addenbrooke lighthouse, ⅝ mile off.	354	NW by N.	9½	359
54. To Kelp Point, 2 miles off.	345	NW ¼ N.	8¼	367
55. To Fog Rocks light, ½ mile off.	0	NNW ½ W [1]	14½	382
56. To Pointer Island lighthouse, ⅞ mile off.	0	do.[1]	5¼	387
57. To Serpent Point beacon bearing SSE ½ E, distant ¼ mile.	294	W ¼ S [1]	2¾	390
58. To Cliff Bluff (bare point), bearing NNW, distant ⅜ mile.	258	SW ½ W.	1¾	391
59. To Camp Island light bearing N, distant ½ mile.	290	W ¾ S.	3¼	395
60. To Napier Point beacon, ⅛ mile off. Course leads ¼ mile southwestward of Camp Island Light.	353	NW ⅞ N [1]	2⅜	397
61. To Grave Point ⅛ mile off.	345	NW ¼ N [1]	1	398
62. To Main Passage open.	12	N by W ⅜ W.	1½	399
63. To Dryad Point lighthouse bearing WSW, distant ¼ mile.	52	NNE ⅛ E [1]	1⅛	401
64. To ¼ mile south-southwestward of Grassy Island.	323	NW by W ¾ W	1⅞	402
65. To ¼ mile northward of Dall Patch gas buoy.	312	WNW ¾ W.	¾	403

[1] Approximately mid-channel course.

	Course.		Distance in nautical miles.	Distance from Seattle in nautical miles.
	True.	Magnetic.		
QUEEN CHARLOTTE SOUND TO MILBANK SOUND—continued.	°			
66. To Idol Point light, ¼ mile off	287	W by S	4¾	408
67. To Ivory Island lighthouse bearing NE, distant 1 mile.	283	WSW ¾ W	6	414
Course leads ½ mile southward of Dark and Ivory Islands.				
MILBANK SOUND TO GRENVILLE CHANNEL.				
68. To 1 mile northward of White Rocks light	315	WNW ½ W	2¾	417
69. To Vancouver Rock gas and whistling buoy, bearing NE by E, distant 1 mile.	330	NW by W ⅛ W	4	421
70. To Jorkins Point light, ½ mile off	28	N	5⅜	426
71. To Inner Point, ½ mile off	19	N ¾ W	2½	429
72. To Boat Bluff light bearing W ⅜ N, distant ¾ mile.	350	NW ⅝ N	10	439
Course leads ⅜ mile eastward of Cone and Jane Islands.				
73. To Boat Bluff light bearing NE ¾ E, distant ¼ mile.	292	W ½ S	1	440
Course favors north side of North Passage and leads ⅛ mile off Boat Bluff light.				
74. To Separation Point light, ¼ mile off	355	NW by N [1]	2½	442
Favor Separation Point light to avoid rock near Sarah Island.				
75. To Separation Point light bearing SE ½ S, distant 1 mile.	333	NW ⅞ W	1¼	443
76. In mid-channel	12	N by W ⅜ W [1]	3½	447
77. To north end Sarah Island bearing NE ⅝ N, distant ½ mile.	4	NNW ⅛ W [1]	7½	454
78. To north end Sarah Island bearing S by E, distant ⅞ mile.	35	N ⅝ E [1]	1¼	456
79. To Swanson Bay, southeast side, ¼ mile off.	356	NNW ⅞ W [1]	6¼	462
80. To Altanash Inlet, northwest shore, ¼ mile off.	343	NW [1]	8⅜	470
81. To Red Cliff Point, ¼ mile off	328	NW by W ⅜ W [1]	2⅛	472
82. To Wark Island, west end, ¼ mile off	288	W by S [1]	2¼	475
83. To Elephant Head, ¾ mile off	313	WNW ¾ W [1]	7½	482
84. To Kingcome Point light, ¼ mile off	322	WNW [1]	3½	486
85. To Trivet Point, ½ mile off	279	WSW ¼ W	4½	490
86. To Point Cunning, ½ mile off	261	SW ⅝ W	4	494
87. To Yolk Point beacon, ½ mile off	297	W ⅛ S	8¾	503
GRENVILLE CHANNEL TO KETCHIKAN.				
88. To Union Passage entrance	.....	Mid-channel	4½	507
89. To Lowe Inlet beacon	.....	do	9	516
90. To Mountain Point	.....	do	2¼	519
91. To landslide	.....	do	6	525
92. To Granite Bluff	.....	do	3¼	528
Course favors southwest side for first 2 miles.				
93. To Calvert Point, ½ mile off	.....	do	16½	544
94. To Watson Rock light bearing NE, distant ½ mile.	299	W	3	547

[1] Approximately mid-channel course.

	Course. True.	Course. Magnetic.	Distance in nautical miles.	Distance from Seattle in nautical miles.
GRENVILLE CHANNEL TO KETCHIKAN—contd.				
95. To midway between Herbert Reefs light and Kennedy Island.	344	NW.....	5¾	553
96. To Bloxam Passage, barely open.....	344	.....do.....	¾	554
97. To midway between Elliott Island and White Cliff Island.	322	WNW.....	1½	555
98. To Quinn Rocks beacon, ¾ mile off.....	335	NW ¾ W.....	1⅜	557
Course leads ⅜ mile northeastward of Cecil Patch.				
99. To Lawyer Islands lighthouse, ¾ mile off.	303	W ⅜ N.....	3¼	560
100. To ¾ mile southward of Green Top Island.	326	NW by W ⅝ W.	4¾	565
101. To 1 mile northward of Lucy Island lighthouse.	326	.....do.....	9½	574
102. To Coghlan Rock, 1½ miles off and in range with Coast Mound, Dunira Island.	345	NW ⅛ N.....	8¾	583
Green Island lighthouse is ahead on this course.				
103. To ½ mile southwestward of Green Island lighthouse.	340	NW ⅜ W.....	7¾	591
104. To ¾ mile northeastward of Holliday Island (off Whitley Point).	351	NW ⅝ N.....	3⅝	594
105. To Tree Point lighthouse 1½ miles off....	321	WNW.....	12½	607
106. To Mary Island lighthouse, ¾ mile off.....	340	NW ⅜ W.....	20	627
107. To Twin Islands, ¾ mile off.....	335	NW ¾ W.....	3	630
108. To Hog Rocks light, ½ mile off.....	310	W by N.....	3¼	633
109. To Angle Point, ¼ mile off.....	300	W.....	6¼	639
110. To Spire Island Reef light, ½ mile off....	318	WNW ⅜ W....	3⅛	642
111. To Mountain Point, ⅜ mile off.....	295	W ⅜ S.....	2¼	645
112. To 100 yards northward of Potter Rock gas buoy.	311	W by N.....	1⅜	646
113. To 100 yards southward of Idaho Rock float light.	311	.....do.....	1¼	647
114. To Standard Oil Co. wharf, 300 yards off..	314	WNW ¾W[1]....	1⅜	649
115. To Ketchikan.....	311	W by N.....	¾	649
KETCHIKAN TO WRANGELL NARROWS.				
116. To ⅛ mile past Bar Point buoy No. 4, with East Clump light ahead.	279	WSW ⅛ W.....	1¼	651
117. To buoy No. 6, 100 yards off.....	311	W by N [1].....	1	652
118. To Lewis Reef light, 300 yards off.....	317	WNW ½ W [1]...	1⅝	653
119. To 200 yards south of Channel Island light.	317	.....do.....	1½	655
120. To Rosa Reef light, ¼ mile off.....	322	WNW.....	1¾	657
121. To Guard Islands lighthouse, ½ mile off..	311	W by N.....	3⅜	660
122. To Niblack Point beacon bearing NNE, distant 1⅝ miles.	297	W ¼ S.....	11	671
123. To Ship Island light, ¾ mile off.....	328	NW by W ½ W.	4¼	675
124. To Narrow Point light, 1⅛ miles off.....	328	.....do.....	14½	690
125. To Lincoln Rock light, 1 mile off.....	328	.....do.....	17½	707
126. To Point Harrington, 1 mile off.....	351	NW ½ N.....	7⅜	715
For courses through Snow Passage, Sumner Strait, and Chatham Strait, see page 24.				
127 To Steamer Point light, ¾ mile off.....	13	N by W ½ W..	3½	718
128. To Round Point, ⅜ mile off.....	45	N by E ¼ E...	4	722
129. To Vank Island light bearing W by N, distant 1⅝ miles.	16	N by W ¼ W...	10	732
130. To Wrangell.....	69	NE ½ N.....	6¼	738

[1] Approximately mid-channel course.

	Course.		Distance in nautical miles.	Distance from Seattle in nautical miles.
	True.	Magnetic.		
KETCHIKAN TO WRANGELL NARROWS—contd.	°			
131. To Vank Island light, 3/8 mile off	257	SW 1/8 W	7 1/4	746
132. To Point Craig beacon, 1/2 mile off	286	WSW 3/4 W	4 1/2	750
133. To Point Alexander light bearing N, distant 1/2 mile.	286	do	7 7/8	758
WRANGELL NARROWS.				
On account of the currents, the courses in Wrangell Narrows should be used with caution. See also page 134.				
134. To 1/8 mile westward of Midway Rock light	348	NW 1/4 N	1 3/4	760
135. To Point Lockwood, 150 yards off	8	NNW [1]	1 1/2	761
136. To close eastward of Point Lockwood Rock float light.	343	NW 1/4 W	5/8	762
137. To mid-channel position 300 yards westward of Point Lockwood Rock float light.	299	W 1/8 S	1/8	762
138. To Battery Islets light, 150 yards off	342	NW 3/8 W [1]	1/2	762
139. To No Thorofare Point, 200 yards off	5	NNW 1/4 W [1]	7/8	763
140. To mid-channel position 400 yards northwestward of Spike Rock light.	354	NW 3/4 N	3/4	764
Give eastern shore a berth of 200 yards and pass 50 yards eastward of Spike Rock light.				
141. To 30 yards westward of Burnt Island Reef float light.	19	N by W	1/2	765
142. To position 3/8 mile northward of Burnt Island Reef float light.	36	N 1/2 E	3/8	765
143. To position 100 yards eastward of South Ledge light.	21	N 7/8 W	3/8	765
144. To Bush Top Island light, 75 yards off, passing the buoys about 50 yards off.	37	N 1/2 E	3/4	766
145. To 100 yards eastward of Colorado Reef buoy.	64	NE by N	1/2	767
146. To 40 yards westward of buoy No. 6A	33	N 1/4 E	3/4	767
147. To position 200 yards northeastward of light 1/4 mile west of Blind Point.	17	N by W 1/4 W	1/4	768
148. To 150 yards southwestward of Danger Reef buoy, passing between buoys Nos. 8 and 9.	323	WNW	5/8	768
149. To position 150 yards north-northeastward of South Green Rocks light.	358	NW by N	1/2	769
150. To 50 yards southwestward of Rock Point buoy.	320	WNW 1/4 W	1/4	769
151. To Finger Point, 175 yards off	341	NW 1/2 W	5/8	770
152. To North Flat buoy 18, 75 yards off	335	NW by W	3/4	770
153. To North Flat light, 75 yards off	352	NW 1/2 N	1/4	771
154. To light off Green Point, 100 yards off	8	NNW	1/2	771
155. To Mountain Point beacon, 300 yards off.	357	NW by N	2 1/8	773
156. To Blunt Point Reef float light, 100 yards off.	340	NW 1/2 W	2 5/8	776
157. To Bayou Point light, 125 yards off	350	NW 3/8 N [1]	1 5/8	777
158. To Petersburg float light, distant 200 yards in line with radio tower.	38	N 5/8 E	1/2	778
159. To Petersburg wharf	84	NE 3/4 E	5/8	778
160. To position off wharf	357	NW by N	1/8	779
161. To position 1 1/8 miles NE by N from Prolewy Rocks light.	59	NNE 1/2 E	1 3/4	780

[1] Approximately mid-channel course.

	Course.		Distance in nautical miles.	Distance from Seattle in nautical miles.
	True.	Magnetic.		
WRANGELL NARROWS TO JUNEAU.	°			
162. To 3/8 mile southwestward of Sukoi Islets light.	340	NW ½ W.....	4	784
163. To Beacon Point beacon, ¾ mile off.....	346	NW.....	3	787
164. To Cape Strait light, ¾ mile off.....	319	WNW 3/8 W....	5	792
165. To Cape Fanshaw light bearing NE, distant 1¼ miles.	301	W.....	20¼	813
166. To ½ mile northeastward of Southeast Five Finger Islands lighthouse.	358	NW by N.....	5½	818
167. To Point Hugh light, 1½ miles off.....	347	NW.....	21¾	840
168. To 1⅛ miles southwestward of Midway Islands light.	347	.....do.....	12¾	853
169. To Grave Point light, ½ mile off.....	333	NW by W ⅛ W.	15½	868
170. To Grand Island, ½ mile off.....	343	NW ¼ W.....	2¾	871
171. To Point Arden light, ½ mile off.....	327	NW by W ¾ W.	4⅜	875
172. To Marmion Island light, ½ mile off.....	316	WNW ¾ W....	3½	879
173. To Sheep Creek Flat light, ¼ mile off....	316	.....do.[1].....	4¼	883
174. To Juneau.....	316	.....do.[1].....	3⅜	886
JUNEAU TO SKAGWAY.				
175. To Sheep Creek Flat light, ¼ mile off....	136	ESE ¾ E [1]....	3⅜	890
176. To Marmion Island light, ½ mile off.....	136	.....do.[1].....	4¼	894
177. To Marmion Island light, bearing W, distant ½ mile.	178	SE by S.....	⅝	895
178. To Marmion Island light, bearing NNW, distant 1 mile.	220	S ¾ W.....	1	896
179. To Point Hilda, ½ mile off.....	282	WSW ¼ W....	8	904
180. To point, ½ mile off.....	288	WSW ¾ W....	3	907
181. To Middle Point light, ½ mile off.....	307	W ½ N.....	1¾	908
182. To Portland Island, northwest end, bearing NNE, distant ½ mile.	326	NW by W ⅞ W.	7	915
183. To Shelter Island light, ½ mile off.....	336	NW by W.....	2⅞	918
184. To ½ mile southwestward of Sentinel Island lighthouse.	336	.....do.....	10¾	929
185. To 1¼ miles northeastward of Vanderbilt Reef buoy.	336	.....do.....	3⅝	933
186. To Point Sherman light, 1½ miles off....	336	.....do.....	16	949
187. To ½ mile northeastward of Eldred Rock lighthouse.	358	NW by N.....	7¾	956
188. To Seduction Point, 1½ miles off.....	346	NW ⅛ W.....	7¼	964
189. To Katzehin River Flats buoy, ¼ mile off.	338	NW ¾ W.....	6¾	970
190. To Battery Point light, ¼ mile off (local attraction).	338	.....do.....	1¼	972
191. To Low Point light, ⅜ mile off.....	344	NW ¼ W.....	3⅛	975
192. To Skagway Bluff.....	4	NNW ½ W [1]...	9½	984
193. To Skagway.....	32	N.....	2	986
STEVENS PASSAGE TO CAPE SPENCER.				
From Middle Point light, ½ mile off (see course No. 181).				
182a. To Favorite Reef buoy, ¼ mile off.....	318	WNW ½ W....	10⅞	919
Barlow Island light is ahead on this course.				
183a. To Barlow Island light, ¼ mile off.....	326	NW by W ⅞ W	1⅞	921
184a. To Point Retreat light bearing SE, distant ½ mile.	301	W.....	2	923

[1] Approximately mid-channel course.

	Course.		Distance in nautical miles.	Distance from Seattle in nautical miles.
	True.	Magnetic.		
STEVENS PASSAGE TO CAPE SPENCER—contd.				
185a. To Point Retreat light bearing ENE, distant 5/8 mile.	229	S by W ½ W...	5/8	924
186a. To False Point Retreat beacon, ½ mile off.	189	SSE.....	2½	926
187a. To Couverden Rock, 2⅜ miles northward of Rocky Island, 1¼ miles off.	181	SSE ¾ E.....	9½	936
188a. To Rocky Island light, 5/8 mile off..... Naked Island light is astern on this course.	209	S ¼ E.....	3	939
189a. To Rocky Island light, bearing N by W, distant 5/8 mile.	254	SW ¼ S.....	¾	940
190a. To Point Adolphus, 1 mile off.....	289	WSW 7/8 W.....	24¼	964
191a. To Lemesurier Island, north point, 1 mile off.	284	WSW ½ W.....	8½	972
192a. To the northwestern Inian Island, ½ mile off.	255	SW.....	12⅜	985
193a. To Cape Spencer light, 1½ miles off....	227	S by W ½ W..	8¾	993
CAPE SPENCER TO YAKUTAT.				
194a. To Cape Spencer light bearing NE, distant 5 miles.	268	SW by W.....	6	999
195a. To Icy Point, 4 miles off.....	310	W ¾ N.....	15¼	1,015
196a. To La Perouse Glacier, 4 miles off.....	310	.....do.....	8	1,023
197a. To Harbor Point, 3 miles off.....	310	.....do.....	14¼	1,037
198a. To Ocean Cape light, 2 miles off.....	310	.....do.....	87	1,124
199a. To Ocean Cape light, bearing E, distant 2½ miles.	342	NW ⅜ W.....	3	1,127
200a. To Point Carrew, bearing E ¼ S, distant 1⅞ miles.	45	N by E ¼ E...	1½	1,128
201a. To Turner Point Shoal buoy, 200 yards off.	110	E by N.....	3⅜	1,132
202a. To Yakutat.....	110	.....do.....	1½	1,133
SNOW PASSAGE TO POINT HUGH BY WAY OF CAPE DECISION. Courses and distances from Lincoln Rock to Stephens Passage, by way of Snow Passage, Sumner Strait, Chatham Strait, and Frederick Sound for vessels not desiring to pass through Wrangell Narrows. Replaces course No. 126, page 21, to course No. 167, page 23, inclusive.				
126a. Lincoln Rock light, 1 mile off, to ½ mile southwestward of Key Reef light.	328	NW by W 5/8 W.	7½	715
127a. To Bushy Island light bearing SE by S, distant ½ mile. Course leads in mid-channel through Snow Passage.	333	NW by W 1/8 W.	8½	723
128a. To Port Colpoys, 1¼ miles off..... Course leads midway between eastern Rookery Island and McNamara Point and ¼ mile northward of a 26-foot spot between them.	301	W.....	8½	732
129a. To Helm Rock Buoy, 7/8 mile off, heading for Strait Island light.	277	SW by W 7/8 W.	15¾	747
130a. To Port Protection, south side, bearing ENE ½ E, distant 2⅛ miles, heading for Beauclerc Island light.	222	S by W.....	4	751

	Course. True.	Course. Magnetic	Distance in nautical miles.	Distance from Seattle in nautical miles.
SNOW PASSAGE TO POINT HUGH BY WAY OF CAPE DECISION—continued.				
131a. To Point Amelius, 4¼ miles off, with Strait Island light astern. Course leads 1 mile westward of Calder Rocks.	° 193	S by E ½ E....	9½	761
132a. To Point St. Albans light bearing NW ½ W, distant 4 miles.	208	S ¼ E.....	10	771
133a. To Spanish Island lighthouse, ½ mile off.	252	SW ⅜ S.....	6¾	778
134a. To Cape Decision bearing N, distant 1⅛ miles.	252	.....do.....	1½	779
135a. To Point Crowley abeam, distant 4 miles.	309	W ¾ N.....	8	787
136a. To Point Harris, 2½ miles off.....	354	NW ¾ N.....	13	800
137a. To Point Ellis light, 3¼ miles off.....	354	.....do.....	16¾	817
138a. To Kingsmill Point light, 2 miles off....	354	.....do.....	17	834
139a. To Turnabout Island light, 3½ miles off..	34	N ¼ E.....	23½	857
140a. To 2 miles eastward of Spruce Island....	34	.....do.....	2	859
141a. To ⅜ mile westward of Round Rock....	34	.....do.....	5¼	864
142a. To False Point Pybus, 1 mile off.....	34	.....do.....	5½	870
143a. To Point Gambier light, 1¼ miles off....	16	N by W ¼ W..	5½	875
144a. To Point Hugh, 2¾ miles off.....	16	.....do.....	7¾	883
145a. To Point Hugh light, 1½ miles off..... From here follow course No. 168, page 23.	347	NW ⅛ N.....	4	887

COURSES AND DISTANCES FROM SITKA TO JUNEAU.

	Course. True.	Course. Magnetic.	Distance in nautical miles.	Distance from Sitka in nautical miles.
1. Sitka wharf to 300 yards northward of Channel Rock spindle. Course leads south of Harbor Rock, but deep draft vessels should pass north of it.	° 315	WNW ¾ W....	1⅛	1
2. To Halibut Point, ¼ mile off.....	327	NW by W ¾ W.	2½	4
3. To Old Sitka Rocks, outer end, 400 yards off.	342	NW ⅜ W.....	1	5
4. To Big Gavanski Island, northeast end, ¼ mile off.	10	N by W ⅞ W..	1½	6
5. To Eastern Point, 350 yards off.....	333	NW by W ⅛ W.	2¾	9
6. To 150 yards southwestward of point.....	316	WNW ⅝ W....	¾	10
7. To 100 yards northward of Middle Shoal buoy.	322	WNW ⅛ W....	1½	11
8. To Creek Point, 125 yards off.....	311	W ⅞ N.....	⅝	12
9. To Olga Point bearing SW, distant ¼ mile...	320	WNW ¼ W....	1⅛	13
10. To Neva Point Reef beacon, 200 yards off...	283	WSW ⅜ W....	¾	14
11. To Neva Point Reef beacon, bearing ENE, distant 400 yards.	.....	.....	¼	14
12. To 30 yards northeastward of buoy No. 1... For description of Neva Strait, see page 199.	340	NW ½ W.....	½	14
13. To 30 yards northeastward of buoy No. 3...	348	NW ⅛ N.....	¼	15

COURSES AND DISTANCES FROM SITKA TO JUNEAU—continued.

	Course.		Distance in nautical miles.	Distance from Sitka in nautical miles.
	True.	Magnetic.		
	°			
14. To 30 yards northeastward of spar buoy No. 5.	335	NW by W.	1/8	15
15. To 30 yards southward of Wyvill Reef buoy.	329	NW by W 1/2 W.	1 5/8	16
16. To midway between Highwater Island and a black buoy.	333	NW by W 1/8 W.	5/8	17
17. To Entrance Island, 300 yards off	333	do	5/8	18
18. To 300 yards northward of point	333	do	7/8	19
19. To 300 yards northward of Kane Islands	317	WNW 5/8 W.	1 3/4	20
20. To point on north side, 1/4 mile off	312	W by N	3/4	21
21. To Kakul Rock buoy, 1/4 mile off	329	NW by W 1/2 W.	1 3/4	23
22. To 100 yards eastward of Brad Rock buoy	33	N 1/4 E	1	24
23. To Channel Rocks, 200 yards off	33	do	1/8	24
24. To midchannel off Range Point	77	NE 1/8 E	1	25
25. To Suloia Point, 1/4 mile off	53	NNE	1/2	25
26. To 300 yards west-southwestward of West Francis Rock buoy.	6	NNW 1/4 W.	1 1/4	27
27. To 100 yards eastward of Liesnoi Shoal buoy Course leads through Sergius Narrows, 100 yards off Sergius Point beacon and 75 yards off the northwest shore, abreast Prolewy Rock. See heading Sergius Narrows, page 203.	70	NE 1/2 N.	1 1/4	28
28. To islet off east end of Big Island, 400 yards off.	38	N 5/8 E.	1 1/2	29
29. To Middle Point Rock beacon, 250 yards off.	6	NNW 1/4 W.	1/2	30
30. To 250 yards northwestward of Yellow Point.	40	N 3/4 E.	3/4	31
31. To 150 yards eastward of Rose Island Rock buoy.	76	NE.	7/8	32
32. To Big Rose Island, northeast end, 150 yards off.	9	NNW	1/4	32
33. To point on west side, 1/4 mile off	353	NW 5/8 N.	1 3/8	33
34. To point on west side, 1/4 mile off	346	NW[1]	1	34
35. To Povorotni Island, 1/4 mile off	338	NW 3/4 W.	1 1/8	35
36. To Povorotni Island bearing SE, distant 1/4 mile.	22	N 3/4 W.	3/8	36
37. To position between Otstoia Island light and a red buoy.	54	NNE	4 3/8	40
38. To 200 yards southward of Cozian Reef buoy.	63	NNE 7/8 E.	7/8	41
39. To Broad Island bearing W 3/4 N, distant 1 1/4 miles.	80	NE 3/8 E.	2 1/4	43
40. To False Lindenberg Head, 1/2 mile off	129	E 3/4 S.	10 3/4	53
41. To McClellan Rock light, 1/2 mile off	112	E 3/4 N.	2 3/8	56
42. To Fairway Island light, 1/2 mile off	86	NE 7/8 E.	5 1/8	61
43. To Morris Reef buoy, 1/2 mile off	86	do	2 1/8	63
44. To Morris Reef buoy bearing SW 3/4 W, distant 1 mile.	59	NNE 1/2 E.	1	64
45. To North Passage Point, 2 3/4 miles off	354	NW 3/4 N.	23 1/2	88
46. To Point Augusta light, 2 miles off	354	do	11 3/8	99
47. To Naked Island light, 1/2 mile off	349	NW 1/4 N.	13 1/8	113
48. To False Point Retreat beacon, 1/2 mile off	353	NW 5/8 N.	7	120
49. To Point Retreat light bearing ENE, distant 5/8 mile.	9	NNW.	2 1/2	122
50. To Point Retreat light, bearing SE, distant 1/2 mile.	49	N by E 1/2 E.	5/8	123
51. To Barlow Island light, 1/4 mile off	121	E.	1 7/8	125
52. To Favorite Reef buoy, 1/4 mile off	146	SE by E 7/8 E.	2	127

COURSES AND DISTANCES FROM SITKA TO JUNEAU—continued.

	Course.		Distance in nautical miles.	Distance from Sitka in nautical miles.
	True.	Magnetic.		
	°			
53. To Middle Point light, ½ mile off	138	ESE ½ E	10⅞	137
54. To point, ½ mile off	130	E ¾ S	1¾	139
55. To Point Hilda, ½ mile off	108	ENE ¾ E	3	142
56. To Marmion Island light bearing NNW, distant 1 mile.	102	ENE ¼ E	8	150
57. To Marmion Island light bearing W, distant ½ mile.	40	N ¾ E	1	151
58. To Marmion Island light bearing S by W ¼ W, distant ½ mile.	358	NW by N	⅝	152
59. To Sheep Creek Flat light, ¼ mile off	316	WNW ¾ W	4¼	156
60. To Juneau	316	do	3⅜	159

ANCHORAGES, INSIDE PASSAGE TROUGH BRITISH COLUMBIA.

The following are the more important anchorages along the line of the inland passage through British Columbia. The descriptions are given to supplement the charts. Anchorage can be made in many other places with the aid of the charts. Anchorages in Alaska are given in the detailed descriptions following the courses.

SEATTLE TO ACTIVE PASS.—**Port Townsend**, Washington, is a good harbor and easily entered. The usual anchorage is in mid harbor for 1½ miles southward of Point Hudson. In entering all dangers are avoided by giving the shores a good berth.

Prevost Harbor (Washington) is a bight in the north side of Stuart Island, inside James Island. It affords an anchorage ¼ mile wide, just within its western entrance, 1½ miles eastward of Turn Point. Enter in mid-channel and select anchorage, with muddy bottom, in the middle of the expansion just within the entrance in 6 to 7 fathoms, taking care to keep clear of a rock lying nearly 200 yards from the south side, which bares 8 feet. The entrance to Prevost Harbor east of James Island is impracticable for vessels.

Otter Bay, on the western side of Pender Island, 1 mile north of Mouatt Point, affords a good anchorage, nearly ¼ mile in extent, in the middle of the bay in 8 fathoms, muddy bottom. The southern point at the entrance is a wooded, high-water islet. There are no dangers in the approaches; a flat extends about 400 yards from the head of the bay.

Plumper Sound lies between Pender Island and Saturna Island, and affords a spacious anchorage in 7 to 8 fathoms in the middle off the entrance to Port Browning and 3 miles westward of Douglas Island, the south point at the eastern entrance to the sound. Small vessels may anchor in **Port Browning** in 6 fathoms. The shores of the sound and at the entrance to Port Browning should not be closely approached; otherwise there are no dangers, and a mid-channel course carries safely. The tidal currents have little velocity.

ACTIVE PASS TO SEYMOUR NARROWS.—**Departure Bay** affords anchorage in 15 to 20 fathoms and is large and easy of access. **Coming from eastward** pass ¾ to 1 mile northwestward of Entrance Island lighthouse, and southward of Snake Island buoy, then head for Jesse Island. Pass southward of the island on a course about southwest and follow a mid-channel course into the bay. Anchorage may be selected in any part of it, giving the shores a berth of about 300 yards. **Coming from westward** pass midway between Five Finger Island and Snake Island and southward of Horswell Reef buoy and enter the harbor in mid-channel southward of Jesse Island.

Tribune Bay, on the southeast side of Hornby Island, 7 miles westward of The Sisters lighthouse, affords anchorage ¾ mile from its head in 8 to 10 fathoms, but is badly exposed to southeast winds. **To enter**, after clearing the ledge, bare at half tide, which extends ½ mile eastward from the bare islet close to the north point at the entrance, keep the north side of the bay aboard at a distance of ¼ to ⅜ mile. Nash Bank, on which are heads bare at low water, extends 1 mile eastward from the south point at the entrance.

Baynes Sound has several good anchorages, but its principal importance is derived from the coal-shipping port at **Union (Comox)**. The southern entrance and the principal dangers in the sound are well marked and the navigation is not difficult with the aid of the chart. The northern entrance is over **Kelp Bar** with a least depth of 10 feet at low water and marked by beacons and buoys. There is telegraphic communication with Victoria.

Oyster Bay, on the southwest side of Georgia Strait, can be used as a temporary anchorage, but is exposed to northerly and easterly winds. A reef, affording some protection from northwest winds, extends ½ mile eastward from **Shelter Point**, the northwest point of the bay. A good berth is a little more than ½ mile from shore, with the highest part of Cape Mudge well open of the low extremity of Shelter Point.

Duncan Bay, on the northwest side of Orange Point, is easy of access and affords a good anchorage in 10 to 16 fathoms, sand, well out of the current and sheltered from all but northwest winds. Shoals make off about 200 yards from the shores of the bay. The mouth of the creek on the south side of the bay is filled by a flat.

SEYMOUR NARROWS TO QUEEN CHARLOTTE SOUND.—**Plumper Bay**, on the northeast side south of Separation Head, affords good anchorage in 8 to 15 fathoms, mud and sand, near the middle of the bay with the south point at the entrance bearing southwest by south (mag.). The eastern and southern shores of the bay should be given a berth of 200 yards, and a rocky patch with 6 fathoms lying 400 yards from the southern and 600 yards from the eastern side of the bay should be avoided when anchoring. If anchored far out the eddies sometimes cause a vessel to surge on her cable.

Deep Water Bay, on the northeast side north of Separation Head, affords anchorage for a small vessel at its southern end in 10 to 12 fathoms. Larger vessels can select anchorage in the middle of the bay in 25 to 30 fathoms.

Elk Bay, on the Vancouver Island side west-southwestward of Granite Point, is a broad indentation affording anchorage in 15 fathoms, about ⅓ mile from its head. A flat extends 400 yards from the head of the bay.

Vere Cove, indenting the west end of Thurlow Island, has anchorage for a small vessel in 17 fathoms.

Blinkinsop Bay, on the north side of the entrance to Sunderland Channel, 3 miles eastward of Port Neville, is a good anchorage. Enter in mid-channel and anchor a little westward of the middle in 7 to 10 fathoms to avoid the rocks on the eastern side. A good berth is with the western point at the entrance in line with the south end of Jesse Island and Point Tuna on with the summit of York Island.

Forward Bay, on the north side of Johnstone Strait, 4 miles westward of Broken Islands, is a broad but slight indentation affording fair anchorage in 15 to 16 fathoms, sheltered from all except southeasterly winds. A flat extends 400 yards from the stream at the head of the bay; the best anchorage is off the edge of this flat. There is an islet close to the shore ¼ mile eastward of the anchorage, and two others close to shore ¾ mile southwestward of the anchorage. Approaching from eastward take care to avoid Escape Reef.

Alert Bay, on the south side of Cormorant Island, is easy of access and affords a good and well-sheltered anchorage in 7 to 9 fathoms, muddy bottom, the bay being free from dangers. Alert Bay is a post office and native village with a sawmill, cannery, and cannery wharf with a depth of about 12 feet at its end.

Queen Charlotte Sound to Milbank Sound.—**Beaver Harbor** is formed by several islands lying in the bay, and affords a good anchorage inside the islands. Anchorage can be made on the southwest side of Deer Island, between it and Cattle Islands, in 10 to 14 fathoms. The best anchorage is between Cattle Islands and the western shore, favoring somewhat the islands, in 8 to 12 fathoms. With the aid of the chart, vessels entering from eastward can pass between Deer Island and Thomas Point, and from northward, can pass between Peel Island and the point westward of it.

Safety Cove, on the western shore of Fitzhugh Sound, 6½ miles northward of Cape Calvert, is about 1 mile long and ¼ to ⅜ mile wide. The cove affords a safe and convenient anchorage for vessels having to wait to cross Queen Charlotte Sound, and is easily entered. The north point at the entrance is marked by two small islets; on the south side just within the entrance is a conspicuous white landslide. The shores are high and steep-to except at the head, where there is a flat 600 yards wide with 7 fathoms close to its edge. Good anchorage will be obtained in 15 fathoms, muddy bottom, in the middle of the cove, abreast a small waterfall on the north shore. Entering at night, a vessel should keep in the middle of the cove, keep the lead going, and anchor as soon as 17 fathoms is reached.

McLoughlin Bay (Bella Bella) is a small cove indenting the west side of Lama Passage, about 2½ miles above Camp Island Light. The shores are rocky, except at the southwest corner of the bay, where a small stream comes in. Within the bay the soundings vary from 7 to 16 fathoms. The best anchorage is in 11 fathoms, about 250 yards off the middle of the beach, with the southwest point of Narrows Island showing westward of Grave Point and Archibald Point open east of Napier Point.

Ormidale Harbor, on the south side of Seaforth Channel, has its navigable entrance west of Nevay Island and ⅞ mile southwestward of Grassy Island. The entrance to the harbor is 300 yards

wide, with not less than 13 fathoms. A mid-channel course is free from dangers, and anchorage may be had 400 yards south-southeastward of Nevay Island in 17 fathoms, sand and mud. **Wellington Rock** has 3 fathoms over it and lies in Seaforth Channel off the middle of the entrance to Ormidale Harbor, 450 yards from the points at the entrance.

Milbank Sound to Grenville Channel.—**Nowish Cove** has its entrance on the east side of Finlayson Channel ½ mile northward of Sisters Islets. It is about 300 yards wide at its entrance, contracting to 150 yards, and then expands at 600 yards from its entrance, forming a cove which affords an anchorage with a clear width of 200 yards, in 10 to 14 fathoms, sandy bottom. A mid-channel course leads in safely.

Klemtu Passage.—An anchorage with a clear width of about 300 yards may be had in the channel abreast Clothes Bay (1⅜ miles above the southeast end of Cone Island), in 12 fathoms, sand and shell.

Swanson Bay is on the eastern shore of Graham Reach, 7 miles above Sarah Island; abreast this bay on the opposite shore is a conspicuous waterfall. Anchorage may be had in the northern part of Swanson Bay in 19 fathoms, sandy bottom, with the waterfall shut in with the northwest point at the entrance, and the western shore of Graham Reach shut in by the southeast point at the entrance. A wharf with 27 feet at its end is in the north end of Swanson Bay; fresh water can be obtained at the wharf.

Home Bay, at the eastern end of Wright Sound 1 mile southward of Nelly Point, is about ⅜ mile in extent, with a flat nearly 300 yards wide at its head; a small islet lies off the south point at the entrance. Anchorage will be found in 14 fathoms, sandy bottom, close to the flat and 200 yards north of an islet on the south side, with Mount Gil (3,000 feet) in line with the south point at the entrance, bearing southwest by west (mag.).

Coghlan Anchorage, on the north side of the western end of Wright Sound between Promise Island and Camp Point, is 2 miles long in a northwesterly direction, with an average width of ⅜ mile, and is a good anchorage. Observation Point lies on the southwest side 1 mile inside Camp Point. **Harbor Rock**, which bares 6 feet and is of small extent, lies in the middle of Coghlan Anchorage ½ mile north-northwestward of Observation Point. The anchorage for small vessels is ¼ to ½ mile above Harbor Rock, slightly favoring the eastern shore in 7 to 9 fathoms, sandy bottom. Or, for a large vessel or those not wishing to go beyond Harbor Rock, anchor in mid-channel about halfway from Observation Point to Harbor Rock, with the point bearing about south, in 18 to 19 fathoms, sandy bottom. In entering keep in mid-channel to avoid shore ledges which extend about 100 yards from Thom Point (northeast point at entrance) and Observation Point. Mount Gil (3,000 feet) in line with Thom Point will lead northeast, and Camp Point open from Observation Point will lead westward of Harbor Rock.

Grenville Channel to Revillagigedo Channel.—**Lowe Inlet** has its entrance on the northeastern side of Grenville Channel 13½ miles from Wright Sound, and affords a good anchorage. **Tom Islet**, small and wooded, lies close to the northeastern side 400 yards northwest of Lowe Inlet. The inlet is 1¾ miles long in a northerly direction, widening from 400 yards at its entrance to over 600 yards inside. Two rocks, awash at high water, lie nearly 200 yards from

the western side at a point 800 yards within the entrance. The currents in Grenville Channel have considerable velocity past the entrance to Lowe Inlet, and allowance must be made for them in entering so as not to be set on to the points at the entrance. This is the case especially at night when coming from westward against a strong flood current; under such conditions it is recommended to favor the southern side of Grenville Channel until the west point at the entrance to the inlet is well abaft the beam, and then haul sharply into the entrance, favoring the eastern side. Favor the eastern side somewhat in passing the rocks on the western side, and anchor in mid-channel nearly 1 mile within the entrance and about ¼ mile below the entrance to Nettle Basin, in 19 to 20 fathoms, muddy bottom. Anchorage may be had in 16 fathoms, muddy bottom, in the middle of Nettle Basin, which forms the head of the inlet. There is a cannery and wharf on the west side of Lowe Inlet, and water can be obtained.

Klewnuggit Inlet, on the northeast side of Grenville Channel, ¾ mile north of Klewnuggit Light, is ½ mile wide at its entrance south of Leading Island. The anchorage is in the north arm of the inlet on the northeast side of Leading Island in 20 to 25 fathoms, and is ¼ mile wide.

Stuart Anchorage lies on the southwest side of Grenville Channel, 5 miles eastward of Watson Rock Light. The anchorage is sheltered on its southeast side by Bonwick Point, low, wooded, and prominent. **Stag Rock,** which bares 13 feet, lies 800 yards west-northwestward of Bonwick Point. Foul ground, marked by kelp, extends 600 yards west-northwestward from Stag Rock, and a small patch, bare at low water, lies nearly 200 yards southward of the rock. Anchorage will be found in 10 to 15 fathoms, rocky bottom, 400 yards westward of Stag Rock, with the south extremity of Gibson Island seen touching the north side of Calvert Point, Pitt Island. In proceeding for this anchorage, especially at high water, care is necessary. It is safer in coming from eastward to pass north of Stag Rock and approach from westward, keeping the Pitt Island shore aboard at a distance of ¼ mile.

Cardena Bay is an open bay on the southeast end of Kennedy Island, and is fronted by a mud bank, which extends nearly ¾ mile from shore, with depths of 5 to 10 fathoms. A convenient and easily accessible anchorage may be made on this bank from ¼ to ½ mile from shore. Ordinary southeasters do not blow home.

Chalmers Anchorage lies on the northwest end of Elliott Island. Anchorage may be obtained in 13 to 14 fathoms 400 yards from the north end of Elliott Island, with that point seen in line with the south extreme of White Cliff Island, bearing north-northeastward.

There are numerous **anchorages in Chatham Sound.** The best on the eastern side are Prince Rupert Harbor, Metlakatla Bay, Duncan Bay, Big Bay, Pearl Harbor, and Port Simpson, and for which reference is made to the charts (see index map).

TIDAL CURRENTS, INLAND PASSAGE THROUGH BRITISH COLUMBIA.

The flood current sets eastward through Juan de Fuca Strait into Admiralty Inlet southeastward, and northward through the channels of Washington Sound into Georgia Strait, and meets the flood cur-

rent which has come from northwestward in Georgia Strait, southward of Cape Mudge. The ebb current from the meeting point sets in the reverse direction.

In **Juan de Fuca Strait** the flood sets eastward and the ebb westward, and throughout the strait and at the entrance to Admiralty Inlet, Haro Strait, Rosario Strait, and the minor channels of Washington Sound the currents continue to run about one hour after high and low water by the shore. From the entrance to Juan de Fuca Strait to Race Rocks the estimated velocity is 1 to 3 knots, varying with the range of tide, and affected somewhat by strong winds. In the wider portion of the strait eastward of Race Rocks the estimated velocity is 1½ to 3 knots until approaching the entrance to Admiralty Inlet, and tide rips occur on all the banks in Juan de Fuca Strait. Throughout the Strait of Juan de Fuca the tidal current is nearly simultaneous.

In **Haro Strait** the flood current sets northward through the strait and the ebb in the opposite direction. At its northern entrance the flood sets eastward on both sides of Sucia Islands, and eastward across Alden Bank. The velocity of the current in the strait is 2 to 5 knots, increasing to between 3 and 6 knots at Discovery Island, between Stuart Island and Gooch Island, at East Point, and between Patos Island and Sucia Islands. The current has moderate velocity between Sucia Islands and Orcas Island. In the strait the currents continue to run about one hour after high and low water by the shore. To find the approximate time of slack water at East Point add 24 minutes to the time of high water and 26 minutes to the time of low water at Seattle, Wash. Heavy tide rips occur on Middle Bank and northward of it and around Discovery Island. Tide rips also occur between Henry Island and Turn Point on the ebb, and around Turn Point. Heavy, dangerous tide rips occur between East Point and Patos Island and for 2 miles northward in Georgia Strait.

In **Swanson Channel** the flood current sets westward and the ebb flows eastward through the channel with a velocity of 1 to 3 knots.

In **Active Pass** the flood current sets from Swanson Channel into Georgia Strait, and the ebb in the opposite direction. The velocity during large tides is sometimes 7 knots, and with ordinary tides it is from 3 to 5 knots. The current turns from flood to ebb 35 minutes before the time of high water at Seattle, Wash., and from ebb to flood 10 minutes before the time of low water. The time of slack water is more uncertain for small tides than for large tides. In the northern entrance there are sometimes heavy tide rips, caused by a shoal of 5 to 9 fathoms and the meeting of the current with that in Georgia Strait.

In **Porlier Pass** the current turns from flood to ebb 49 minutes before the time of high water at Seattle and from ebb to flood 21 minutes before the time of low water. The velocity at strength is from 5 to 8 knots.

In **Gabriola Pass** the current turns from flood to ebb 46 minutes before the time of high water at Seattle and from ebb to flood 49 minutes before the time of low water. The velocity at strength is from 6 to 8 knots.

In **Georgia Strait** the flood current sets northwestward until it meets the flood current from Discovery Passage between Cape Mudge

and Cape Lazo at a distance from 5 to 20 miles from Cape Mudge, depending on the range of the tide and the winds. The ebb current from the meeting point sets in the reverse direction and has a greater velocity than the flood (see "Tidal currents," p. 10). From the southeastern end of the strait, as far as Fraser River entrance, the velocity is about 2 to 3 knots, from Fraser River entrance to Sisters Rocks about 1 to 3 knots, and farther westward rarely exceeds 1 to 2 knots, except at the entrance to Discovery Passage.

For the greater portion of Georgia Strait the times of turning of the current are nearly simultaneous with the times of the tides at Sand Heads light vessel, or about 34 minutes after the times of the tides at Seattle.

In **Baynes Sound**, the currents turn at practically the times of high and low waters.

In **Discovery Passage** the flood current sets through southeastward into Georgia Strait, and the ebb in the opposite direction. Southward of Seymour Narrows the velocity is 3 to 6 knots, and the currents turn at the time of high and low water. Northward of Seymour Narrows the velocity is 1 to 4 knots, and the currents continue to run from 1½ to 2 hours after high and low water by the shore. Between Cape Mudge and Willow Point dangerous tide rips occur during the flood (south flowing) current with a southeast wind. A number of small vessels have been lost in the tide rips at this point, and larger vessels have been endangered at such times.

Seymour Narrows.—The flood current coming from northward sets through Seymour Narrows and Discovery Passage into Georgia Strait, and the ebb current sets in the opposite direction, so that the flood current in Seymour Narrows flows southward continuously from "low-water slack" to the following "high-water slack," when the ebb current begins and flows northward continuously from "high-water slack" to the following "low-water slack." The estimated velocity at the southwest point of Maud Island, where it is greatest, is 8 to 12 knots, or more.

At the turn of the current (slack water) there is a period, varying inversely with the range of tide from 5 to 30 minutes, when the current has little or no velocity. To find the approximate time of "high-water slack" at Seymour Narrows add 4 hours 48 minutes to Sitka time of high water as given in the Tide Tables, and for "low-water slack" add 4 hours 51 minutes to Sitka time of low water; the result is one hundred and twentieth meridian time without further correction. At times there are considerable variations. Mariners are advised to be on hand a sufficient time before the predicted times (say, ½ hour or more) in order to make sure of the desired slack water, in case the predictions happen to be too late. A better value for low-water slack is obtained by adding 11 hours 2 minutes to the time of high water.

Tide Tables for the Pacific Coast of the United States, published annually by the Coast and Geodetic Survey, predict the times of slack water at Seymour Narrows for every day of the year.

With a strong flood current (south flowing) dangerous swirls and overfalls form along the south shore of Maud Island, and to a lesser degree between Maud Island and Race Point. With a strong ebb current (north flowing) more dangerous swirls and overfalls occur

just northward of Ripple Rock; the danger here is increased by the narrowness of the channel.

Vessels should pass through the Narrows at or near the middle of the slack-water period, especially with the large tides and bound northward, and preferably at "high-water slack," so as to take full advantage of the favorable current through Discovery Passage and Johnstone Strait.

High powered vessels with local knowledge sometimes pass through the Narrows as much as 1½ hours before or after slack water on the large tides, and at all stages of the current at weakest neap tides. The practice, however, is dangerous, particularly on the large tides, when there is always the possibility that the actual time of slack water may differ from the predicted time, and the current may have attained a velocity much greater than had been anticipated, resulting in damage to or loss of the vessel. Such disasters have occurred, and the United States Steamboat Inspection Service has ruled in such cases that a master attempting to navigate a vessel through the Narrows at other times than slack water, or nearly slack water, is guilty of unskillfulness.

In **Johnstone Strait** the flood current sets eastward and the ebb westward, and the currents continue to run from 1½ to 2 hours after high and low water by the shore. From Chatham Point to the western end of Thurlow Islands the velocity is 2 to 4 knots, and in the vicinity of Helmcken Island the velocity is 3 to 6 knots; but in other parts of Johnstone Strait the velocity seldom exceeds 1 to 2 knots. Tide rips occur near Chatham Point and between Ripple Point and Knox Bay. Heavy tide rips occur from Ripple Shoal nearly to York Island, which, with an ebb current and westerly wind, are worst westward of Helmcken Island about abreast Salmon Bay, and at times are dangerous to boats and small craft.

In **Broughton Strait** the flood current sets eastward and the ebb westward, and the currents continue to run from 1½ to 2 hours after high and low water by the shore. The velocity is from 1 to 3 knots in the navigable channel.

In **Goletas Channel** the tidal currents have a velocity of 1 to 3 knots, but near the west entrance, in the vicinity of Nahwitti Bar, they have a velocity of 2 to 5 knots, turning shortly after high and low water by the shore; the flood current sets eastward.

In **Christie Passage** the tidal currents have a velocity of 1 to 3 knots; the flood sets southward.

In **New Channel** the tidal currents have a velocity of 2 to 4 knots; the flood sets eastward.

In **Queen Charlotte Sound**, between Pine Island and Cape Caution, the flood current is said to set eastward, with a maximum velocity of 2 knots. At Egg Island the flood current from seaward makes northward into Smith and Fitzhugh sounds.

In **Fitzhugh Sound** the tidal currents have little velocity. The flood current sets northward and meets the flood current from Lama Passage near Pointer Island.

In **Lama Passage** the tidal currents have little velocity between Camp Island and Seaforth Channel, but increase somewhat as Fitzhugh Sound is approached.

In **Seaforth Channel** the tidal currents have a velocity of 1 to 2½ knots, the flood setting eastward.

In **Milbank Sound** the flood current divides near the middle of the sound, setting toward Finlayson, Mathieson, and Seaforth channels. Its velocity is variable, and seldom exceeds 1 knot in Milbank Sound; the velocity is, however, increased within the narrower channels to a maximum of 2 or 3 knots.

In **Finlayson Channel** the flood current sets northward and has greater velocity than in Tolmie Channel. The ebb, however, has greater velocity in Tolmie Channel, and continues to run 1½ hours after slack water in Finlayson Channel. In the narrow parts of these channels both flood and ebb currents attain a velocity of 3 knots at times. In Hiekish Narrows and in the narrowest part of Tolmie Channel, 2½ miles above the south end of Sarah Island, the tidal currents have a velocity of 4 to 5 knots at times, and swirls occur.

In **Graham Reach** the flood current from southward meets that from Wright Sound at the entrance to Aaltanash Inlet. The estimated maximum velocity in the channel is about 3 knots.

In **Wright Sound** the main flood current enters through Lewis Passage and sets across the sound and impinges against Camp Point, causing eddies at that point, and is then deflected toward Grenville Channel. A portion of the flood current from Whale Channel sets into McKay Reach and into Douglas Channel. On the ebb the main body of water from Wright Sound obtains an exit by Whale Channel. In the channels the estimated maximum velocity is about 3 knots.

In **Grenville Channel** the flood current from Wright Sound meets that from Chatham Sound in the vicinity of Morning Point. In the wider parts of the channel the velocity of the current is not great, in most places not exceeding 1 knot. In the narrow part of the channel from Lowe Inlet to Morning Point the flood current has an estimated maximum velocity of 2 knots and the ebb 4 knots, the latter setting eastward, and 1½ hours after low water by the shore.

In **Arthur Passage** the flood current sets northwestward through the passage with a velocity of ½ to 1 knot.

In **Chatham Sound** the flood current enters through the passages connecting it with Dixon Entrance and Hecate Strait, and through Arthur Passage. In these passages the velocity is considerable at times, but in the main body of Chatham Sound the currents have little velocity. Heavy tide rips occur at times off the entrance to Wark Channel, with a strong ebb current setting from the channel.

COAST AND INLAND PASSAGES, DIXON ENTRANCE TO YAKUTAT BAY.

GENERAL INFORMATION.

The topographical features of the islands of southeastern Alaska are similar to those of the mainland to the eastward, but less elevated. Most of the islands are high, rough, and broken. The higher summits are usually sharp, notched, irregular, and show little, if any, modification by erosion. The lower summits are more frequently somewhat rounded, but, together with the flanks of the higher, are so covered with a dense growth of timber as to conceal most of their characteristic features.

The snow line in midsummer reaches an altitude varying, according to local conditions, from 2,000 to 5,000 feet. Glaciers are found in the narrow gorges of the coast ranges. Toward the northern part of

the archipelago, on the continental shore, these glaciers attain great size and even reach the water. On the islands of the archipelago, however, the land does not usually reach a sufficient altitude to retain snow throughout the year. From the great amount of rainfall, at certain seasons, fresh water is readily obtainable in all parts of the archipelago, and there is no difficulty in procuring wood for fuel, timber suitable for small spars, and for most purposes of construction and repair.

The hydrographical characteristics form a parallel to the topographical features above mentioned. The steep inclines and narrow gorges are continued below the sea level and form a system of narrow straits, with deep water, from Puget Sound to Cape Spencer. The rugged nature of the ridges and peaks, and the absence of plains or extensive plateaus, is paralleled by the numerous rocks and reefs, surrounded by deep water, and the general absence of extensive shoals, except at the months of streams or rivers fed by glaciers.

Anchorages are numerous throughout the inland passages. Many of them are suitable for temporary purposes in the summer; during the fall and winter care should be taken to select an anchorage affording good shelter and holding ground whenever practicable.

Harbors and ports.—The principal towns within the limits of this volume are Ketchikan, Craig, Wrangell, Petersburg, Sitka, Treadwell, Douglas, Juneau, Haines, and Skagway. In addition to these there are numerous small settlements that have grown up around canneries and mines.

System of buoyage.—In conformity with section 4678 of the Revised Statutes of the United States, the following order is observed in coloring and numbering buoys in United States waters, viz:

In approaching the channel, etc., from seaward, red buoys, with even numbers, will be found on the starboard side.

In approaching the channel, etc., from seaward, black buoys, with odd numbers, will be found on the port side.

Buoys painted with red and black horizontal stripes will be found on obstructions, with channel ways on either side of them, and may be left on either hand in passing in.

Buoys painted with white and black perpendicular stripes will be found in mid-channel, and must be passed close-to to avoid danger.

All other distinguishing marks to buoys will be in addition to the foregoing, and may be employed to mark particular spots.

Perches, with balls, cages, etc., will, when placed on buoys, be at turning points, the color and number indicating on what side they shall be passed.

Nun buoys, properly colored and numbered, are usually placed on the starboard side, and can buoys on the port side of channels.

Day beacons (except such as are on the sides of channels, which will be colored like buoys) are constructed and distinguished with special reference to each locality, and particularly in regard to the background upon which they are projected.

Aids to navigation.—The lights in southeastern Alaska and the inland passage through British Columbia are described in the Light List, Pacific Coast. The more intricate passages and the principal dangers are marked by beacons and buoys. Steamers carrying pilots and having a regular route are generally kept under way both at night and in thick weather; but the greatest caution is necessary be-

cause of the strong tidal currents and narrow channels, which are the rule. Generally the water is too deep and shores too bold for the lead to be of use when near land or dangers. In foggy weather advantage is taken, wherever practicable, of "whistle echoes." The dangers are usually marked in summer by kelp, but this is often run under by the current.

Kelp grows on nearly every danger having a rocky bottom, and will be seen on the surface of the water during the summer and autumn months; during the winter and spring it is not always to be seen, especially where it is exposed to a heavy sea. Kelp should always be considered a sign of danger, and no vessel should pass through it unless the spot has been carefully examined and sounded. There are, however, many rocks not marked by it; a heavy sea will occasionally tear the kelp away from rocks, and a moderate current will ride it under water so that it will not be seen. It is well to note that dead, detached kelp floats on the water in masses, while live kelp attached to rocks streams away level with the surface.

Pilotage is not compulsory for the inland passage through British Columbia, nor for Alaska except as provided in the United States laws governing the Steamboat-Inspection Service. Reliable licensed pilots can be had at Seattle on inquiry. Pilotage is compulsory for the principal ports in British Columbia. All vessels navigating the inland waters of British Columbia and Alaska should carry a pilot or pilots.

Towboats are stationed at the principal ports of Washington and British Columbia. In the absence of able tugs in southeastern Alaska, any towing that is required is done by small cannery tenders and other small local craft. Vessels requiring this service are those that go to Alaska in the interests of the canneries, and the towboat is sent to meet them at the coast when expected.

Navigation laws of the United States are published by the Bureau of Navigation, Department of Commerce, at intervals of four years, the present edition being that of 1915. A supplement is issued after every session of Congress. The volume and supplements can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.; price, $1 for the volume and 5 cents each for the supplements.

Rules of the road.—International and inland "Rules to prevent collisions of vessels," lines within which the inland rules apply, and "Regulation of motor boats" are published by the Bureau of Navigation, Department of Commerce.

Pilot rules for certain inland waters of the Atlantic and Pacific coasts and of the coast of the Gulf of Mexico are published by the Steamboat-Inspection Service in Form 804.

Copies of these pamphlets are furnished by the officers of the Steamboat-Inspection Service, and can also be had from the Division of Publications, Department of Commerce, Washington, D. C.

Marine hospital.—Information as to relief furnished seamen will be found in the regulations of the United States Public Health Service, which can be consulted at all stations of the service. Such stations are located at ports of any importance, and if not in charge of a service officer, relief will be provided by collectors of customs on request. There are stations at Juneau and Ketchikan in charge of a service officer.

Supplies.—Vessels usually obtain their supply of provisions and ship-chandler's stores at Washington and British Columbia ports. The principal towns and settlements in southeastern Alaska can furnish provisions and a limited supply of ship-chandler's stores. Nearly all the canneries and mining settlements carry a limited supply of provisions for sale. For supplies see also the different headings.

Water can be obtained through pipe and hose at most of the ports and canneries (while in operation) in southeastern Alaska. From the great amount of rainfall at certain seasons and melting of the snow on the mountains, fresh water is obtainable from streams in all parts of southeastern Alaska.

A supply of coal is kept at Ketchikan and Junea; coal can be obtained at times in limited quantities at Wrangell, Sitka, and Skagway. Coal can also be ordered from the ports in Washington and British Columbia, and from there shipped by the regular steamers to the above or other points in southeastern Alaska. The principal ports for the shipment of coal are Tacoma, Seattle, Ladysmith, Nanaimo, and Union (Comox) in Baynes Sound.

Repairs.—There are no docking facilities in southeastern Alaska. The range of tide being considerable, vessels are frequently beached. There are docks and facilities for repairs to hulls, and the machinery of steamers at the principal ports of Washington and British Columbia, the nearest being at Prince Rupert, British Columbia. Minor repairs to the hulls or machinery of small craft can be made at almost any of the canneries.

Communication is had with Puget Sound ports by regular lines of steamers. There is also intercommunication from some of the larger ports in southeastern Alaska to the near-by smaller ports.

There is cable communication between Seattle, the principal ports of southeastern Alaska, and Valdez and Seward.

Weather.—Seasons vary greatly, but in general the summer season, from about May to October, is the drier season, and the rains though frequent are local; occasional gales from southeast to southwest occur, but they are usually less severe than in the fall and winter. From about November to April is the rainy reason, and rains or snows are general, and continue for extended periods with little interruption; gales increase in frequency and severity. The temperature on the outside coast is generally above 32°, but in the inlets reaching into the interior it is considerably lower.

The following table compiled by the United States Department of Agriculture gives the average annual precipitation and extremes of temperature at five places in southeastern Alaska:

Locality.	Length of record.	Average annual precipitation.	Extremes of temperature.	
			Maximum.	Minimum.
	Years.	*Inches.*	*° F.*	*° F.*
Ketchikan	5	160.56	81	— 0
Juneau	16	74.09	86	--10
Skagway	12	22.92	93	—21
Killisnoo	12	46.18	83	— 7
Sitka	16	83.68	87	— 2

Winds.—The prevailing winds in summer are from southwest and northwest, the former during the early months and the latter blowing freshly and with great regularity during June, July, and August. In September and the early part of October the winds are uncertain, and there is generally much calm and heavily overcast weather. The usual winter winds are southeast or southwest, more frequently the former, accompanied by rains; they set in toward the end of October and continue until the middle of April. Southeast winds are invariably accompanied by mist or rain, and east and northeast winds usually bring snow. Southwest and northwest winds are clearing winds. A north or northeast wind frequently occurs at intervals during the months of December, January, and February; it is always accompanied by a high barometer, and at such times a continuance for several days together of clear, cold, frosty weather may be expected. The strength of the summer winds depends greatly upon local circumstances. They frequently blow freshly down the channels with high shores which lie in a northwest and southeast direction. The wind usually begins at sunrise, increases in strength until about 3 p. m., and then gradually moderates toward sunset. The nights as a rule are calm during the summer months; but if the wind prevail but slightly from the northwest during the night it will probably blow hard from that quarter on the following day.

Gales occur at all seasons, but increase in frequency, severity, and duration during the fall and winter months, and toward the north. The summer gales are of shorter duration than those of fall and winter, and seldom last more than 48 hours. In the fall of the year gales lasting for eight days have been experienced. They usually begin in the southeast and terminate and clear from the southwest.

Southeast gales accompanied by thick rainy weather occur at all seasons. They are generally preceded by a short interval of calm, cloudy weather and usually but not invariably by a falling barometer and rising temperature. They spring up gradually from east or east-southeast, hauling southward, accompanied by rain or thick weather, the barometer falling rapidly. When the barometer becomes stationary the wind shifts to the southwest and blows heavily with clearing weather, but with frequent squalls of rain. The barometer begins to rise when the wind hauls to southwest, from which quarter it generally blows from 12 to 20 hours.

When the southwest gale of winter is not preceded by one from southeast the barometer seldom falls, but either remains stationary, when the gale may be expected to continue longer, or rises slowly, when it will gradually subside and fine weather follow. A low barometer in winter is not always accompanied by a gale or bad weather, but on such occasions there is often a heavy fall of snow on the hills and a sudden fall in the temperature.

Northerly gales are almost exclusively confined to the winter season—November to April. They are of rare occurrence in the vicinity of Juan de Fuca Strait, but increase in frequency toward the north. They generally begin from the northeast, accompanied by rain or snow, and back through north to northwest; from the last quarter the wind moderates and the weather clears. These winds sometimes blow with great force, especially through the inlets lying in a north and south direction, and having high land on both sides.

Fog.—On the outside coast of British Columbia and southeastern Alaska, and in the inlets opening from the ocean, fog may occur at any time, but is most frequent in July, August, and September. During this season the fog usually comes after midnight, and holds until the following noon, or later, unless previously dispelled by clearing winds or the drying effect of the sun. During the fall and winter fogs are more infrequent, but when they occur are likely to be of longer duration than those of summer. Continuous fogs, of varying densities, lasting 2 to 10 days have been known. In the spring fogs are rare and of brief duration. Westerly winds are those which drive in sea fog; easterly and northerly winds are the usual clearing winds. Southeast winds also clear away the fog, but are invariably accompanied by mist or rain. Patches of fog hanging about the summits of mountains, a moist atmosphere and a fog bank seaward, together with a westerly wind, are certain indications of a coming fog.

The following table shows the average number of hours per month, from a record of about eight years, that the fog signals were operated at the stated light stations of southeastern Alaska.

HOURS OF OPERATION OF FOG SIGNALS.

Light station.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Tree Point	29	18	20	8	10	10	22	24	17	12	6	18	194
Mary Island	15	10	8	3	7	2	10	13	6	6	10	9	99
Guard Islands	37	24	24	27	7	2	13	10	7	10	10	18	189
Lincoln Rock	29	18	21	8	1	5	11	8	4	3	14	21	143
Southeast Five Finger Islands	79	48	48	13	8	22	21	43	27	29	31	39	408
Sentinel Island	70	44	38	11	3	1	8	7	7	12	53	60	314
Eldred Rock	92	69	39	12	3	1	6	8	6	12	74	71	393

Ice forms at the heads of inlets, where the water is comparatively fresh, and in the rivers; but it seldom forms in the main channels. Floating patches of slush ice, formed in fresh-water streams and lagoons, are sometimes found in the channels but never form an obstruction to navigation. Glacial ice is usually present in the eastern part of Frederick Sound, Stephens Passage between Point Hugh and the western end of Douglas Island, and in Icy Strait and Cross Sound between The Sisters and Cape Spencer. This ice may be encountered at any time throughout the year, and the size of the pieces is sufficient to make them dangerous to navigation.

RADIO SERVICE.

The United States naval coastwise radio stations and all ships of the United States Navy equipped with radio apparatus are open for commercial business. Information concerning regulations, rates, and the commercial work of the stations may be obtained by addressing the Director of Naval Communication, Radio, Va. Hydrographic information, weather reports, storm warnings, and time signals are sent out from the stations for the benefit of shipping.

Time signals.—In connection with the service over the land telegraph lines, time signals by radio are sent daily, Sundays and holi-

days excepted, from certain United States naval coastwise radio stations at noon of the seventy-fifth meridian time on the Atlantic coast and at noon of the one hundred and twentieth meridian time on the Pacific coast. The signals begin at 11.55 and continue for five minutes. During this interval every tick of the clock is transmitted, except the twenty-ninth second of each minute, the last 5 seconds of each of the first 4 minutes, and finally the last 10 seconds of the last minute. The noon signal is a longer contact after this long break. Similar time signals are also sent at 10 p. m. from some of the stations.

The supervision of radio communication in the United States is controlled by the Bureau of Navigation, Department of Commerce. A list of the radio stations of the United States, including shore stations, merchant vessels, Coast Guard cutters, vessels of the United States Navy, and amateurs, and the radio laws and regulations of the United States are published by that bureau, and either publication can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., price 15 cents each. Changes or additions to the stations are published in bulletins issued monthly, price 5 cents per copy or 25 cents per year.

The International List of Radio Stations of the World includes the stations of the United States, excepting amateurs, and contains additional information, such as geographical location, normal range in nautical miles, radio system, and rates. Persons desiring this list should communicate direct with the International Bureau of the Telegraphic Union (Radiotelegraphic Service), Berne, Switzerland. The price is 60 cents per copy, not including postage. The rates of postage are: One copy, 24 cents; 2 copies, 36 cents; 3 copies, 48 cents.

The most important stations in southeastern Alaska are at Ketchikan (call letters KPB), Juneau (call letters KDU), and Sitka (call letters NPB). For a complete list see the "Radio Stations of the United States," mentioned above.

VARIATION OF THE COMPASS.

The magnetic variations for 1920 and annual increase at points mentioned are as follows:

Locality.	Variation.	Annual increase.
	° ′	′
Ketchikan	29 30 E.	2
Lincoln Rock (Clarence Strait)	30 15	2
Petersburg	31 00	2
Turnabout Island (Frederick Sound)	31 00	2
Midway Islands (Stephens Passage)	31 30	2
Juneau	31 45	2
Skagway	32 15	2
Cape Muzon	29 15	2
Cape Decision	30 00	2
Sitka	30 30	2
Salisbury Sound	30 45	2
Killisnoo (Chatham Strait)	31 00	2
Rocky Island (Icy Strait)	31 30	2
Cape Spencer (Cross Sound)	30 45	2
Yakutat Bay entrance	31 00	1

Local attraction has been observed at Port Snettisham; Peril Strait, between Fairway Island and Lindenberg Head, and between Otstoia Island and Povorotni Island; in Gastineau Channel; and at Battery Point in Chilkoot Inlet. These local attractions are more particularly described under the respective headings.

Tides.—Throughout the southeastern part of Alaska the tide is nearly simultaneous. Off the outer coast high water occurs near the time of the transit of the moon, and in the various straits and passages it occurs on an average from 15 to 30 minutes later than on the outer coast.

There is considerable inequality in the heights of the two high waters and of the two low waters of each day. The average difference in the height of the high waters is about 2 feet and the differences in the low waters about 3 feet. This inequality changes with the declination of the moon. When the moon is near the equator it is relatively small, but when the moon is near its greatest north or south declination the inequality reaches a maximum. The tides at this time are called "Tropic Tides."

Off the outer coast the average rise of high water above the plane of reference, which is the mean of the lower low waters, is about 10 feet. Extreme variations from 4 feet below to 15 feet above the datum may be expected.

In the various straits, canals, and other passages, which are characteristic of this region, the range of tide is somewhat larger than on the outer coast, the average rise being from 14 to 15 feet above the datum of mean lower low water and the extreme range from 6 feet below to 22 feet above the same datum.

Attention is called to the fact that while the datum of soundings for this region is generally mean lower low water, in Wrangell Narrows the plane of reference is 3 feet below mean lower low water.

Tide tables for the Pacific coast of the United States, including British Columbia and Alaska, are published annually in advance by the United States Coast and Geodetic Survey. This volume furnishes, at the nominal cost of 10 cents, full tidal data for the Pacific coast of North America.

It contains a table of full daily predictions of the times and heights of high and low waters for certain standard or principal ports along the coast; full explanations for the use of this table are given at the beginning of Table 1 and at the bottom of each page. The use of Table 2 of the tide tables should be known to every navigator. By means of this table the predictions given for the standard ports are extended so as to enable one to obtain complete tidal data for each day for stations only a few miles apart for the greater part of the coast, and with almost the same accuracy as though full predictions were given for all of these points.

Instead of using the height differences of Table 2, however, a more accurate method is that of multiplying both high and low water heights at the standard port by the ratio of ranges (given in Table 2) for the given port to obtain the heights of the corresponding high and low waters. The minus sign before the predicted heights in the tide tables indicates that the water is below the plane of reference, which is mean lower low water.

The time of high or low water at any given port in Table 2 is found by taking the time of the corresponding tide for that day from the

standard port for reference and applying to it the time difference for the given port from Table 2, adding it if the sign is plus and subtracting if minus.

Currents.—A prevailing current sets northwestward along the outer coast of British Columbia and southeastern Alaska, with an estimated velocity of 0 to 1½ knots. Strong southerly winds increase and northwesterly winds decrease its velocity.

Tidal currents.—The tidal currents in the passages of British Columbia and southeastern Alaska have considerable velocity in places, and must be kept in mind. In crossing the entrances to inlets and estuaries, it is necessary to make allowance for the current setting into or from them, according to the stage of tide. The tidal currents follow the general direction of the straits, deflecting into the many inlets and passages. In the larger connecting channels the flood usually sets in from either end, meeting at some central position, the ebb running out in both directions from this point. The range of the tide determines the relative velocity of the tidal currents. The ebb current usually has the greater velocity. In closed canals the velocity of the current, in general, decreases toward their heads, and the turn of the current occurs practically at the time of high and low water, or soon after. See also the remarks on tidal currents, under their respective headings in this volume. In this volume the velocities of the tidal currents are given in knots, which are nautical miles per hour.

Tide tables for the Pacific coast, published annually by the Coast and Geodetic Survey, give the times of slack water for every day in the year for Admiralty Inlet, Seymour Narrows, and Sergius Narrows.

Tide rips and **swirls** occur at numerous places, caused by the meeting of currents or a change in the direction of the current, and over shoals or in places where the bottom is uneven. These are at their worst with the wind opposing the current, and in some places are dangerous, especially to small craft.

For currents, British Columbia, see page 31. Further information concerning currents in Alaska is given in the descriptions of the harbors and channels.

DIXON ENTRANCE

is of importance as forming one of the deep-water inlets to southeastern Alaska from sea, and as one of the connecting waters of the Inland Passage. It extends from Cape Muzon and Langara Island in a general east-northeasterly direction to the Dundas Islands, a distance of 60 miles, with an average width of more than 30 miles; it then contracts to a width of 8 miles between Cape Fox and Dundas Islands, and continues with this width to the mouth of Portland Inlet, a distance of 17 miles. The boundary line between Alaska and British Columbia runs through Dixon Entrance from Cape Muzon.

Langara Island, on the south side of the southwestern end of Dixon Entrance, is a small, irregularly-shaped, densely wooded island, lying close off Cape Knox, the northwesternmost point of Graham Island. Near the middle of the island there is a succession of rounded hills of nearly uniform height, extending in an east and west direction, and attaining an elevation of 525 feet at the highest point.

Langara lighthouse is on the northwestern point of the island in approximate latitude 54° 15¼′ N, longitude 133° 03½′ W. The structure is a white hexagonal tower surmounted by a red circular lantern. The light is flashing white (flash 0.3 second, eclipse 4.7 seconds), 160 feet above the water, and should be visible in clear weather 19 miles. The light is obscured over the land between the bearings of 265° true (SW by W mag.) and 55° true (NNE ⅜ E mag.). The fog-signal building is a white square building standing in front of the lighthouse. The fog signal is a compressed air diaphone, blast 5 seconds, silent 55 seconds. The horn is 100 feet above the water and points 329° true (NW by W ⅜ W mag.). A white rectangular double dwelling stands 400 feet eastward of the lighthouse.

Graham Island forms the southeast side of Dixon Entrance for a distance of 50 miles from Langara Island to Hecate Strait. Its northwestern end is mountainous with Mount Pivot, 1,922 feet high, the most conspicuous. This mountain is situated 2½ miles back from the shore and is of rounded form, somewhat detached from others; it can be seen for about 50 miles in clear weather.

Zayas Island, in the northeastern part of Dixon Entrance and about 4 miles west of Dundas Island, is wooded, flat-topped, and 298 feet high near the southern end.

Dundas Islands, situated in the northeastern part of Dixon Entrance, comprise four large islands, namely **Dundas**, the northwesternmost and largest, **Baron**, **Dunira**, and **Melville**. The coasts of all of these are much indented by small creeks and bays. Dundas Island has a number of conspicuous mountains, of which **Mount Henry**, 1,523 feet high, toward the southern end, is the highest. In the northwestern part are two conspicuous hills, the higher one having an elevation of 795 feet. **Table Hill**, flat-topped, and having a knob 680 feet high, is a conspicuous summit near the north end of the island.

Cape Muzon, the northwestern headland at the entrance to Dixon Entrance, is in latitude 54° 40′ N, longitude 132° 41′ W. It is quite heavily wooded, somewhat precipitous, and attains an elevation of 1,520 feet in a peak 2 miles west of the extremity of the cape.

A breaker lies ¼ mile off the south side of Cape Muzon.

Off the eastern end of the cape is a small cluster of islets, inside of which is a sandy beach, where landing can be made in good weather, and a deserted Indian village.

The north side of Cape Muzon trends westward 3 miles, and in part forms the south side of **McLeod Bay**. Temporary anchorage in 11 fathoms, exposed to all easterly winds, has been made in this bay, ½ mile westward of a green landslide.

One-half mile northwestward of McLeod Bay there is a small boat harbor with a narrow entrance guarded by islets and bare rocks. Islets and bare rocks, known as **Daykoo** and **Datzkoo Islands**, extend 2 miles northwestward from McLeod Bay at a greatest distance off shore of about 1 mile.

Point Marsh, 13 miles northeast of Cape Muzon, is a wooded and comparatively low, narrow point, with a small group of rocky islets close to the point. Between 1 and 2 miles back of Point Marsh the ground rises evenly to an elevation of 1,000 feet, with several irregular knobs showing along the slope. At 3 miles northeast of Point Marsh

is a prominent, nearly bare hill, with rounded top. Numerous rocks, covered at high water, lie about ½ mile southward of the point.

Brownson Bay (chart 8074), 2 miles northeast of Point Marsh, is narrow, and at its entrance is somewhat obstructed by islets and rocks. It affords indifferent anchorage in about 15 fathoms, ¼ mile south-southeast of the rock awash at high water near the head of the bay. In entering, favor the western side of the bay, taking care to avoid a rock, bare at low water, that lies ⅝ mile north-northeastward of the western point at the entrance.

Bean Island is wooded and has a number of rounded, steep-sided, rocky nubbles from 400 to 600 feet high. From westward it shows a rounded hill, which stands well above the general level of the island.

Point Nunez, the southeast end of Bean Island, lies 20½ miles 87° true (NE by E ⅛ E mag.) from Cape Muzon. It is several rocky ridges, with bare bluffs 150 to 200 feet high on the seaward face.

Nunez Rocks, 1 mile 175° true (SE by S mag.) from Point Nunez and 3¼ miles 234° true (SSW ¼ W mag.) from Cape Chacon, is a reef ¾ mile long in a southeast direction, and ¼ mile wide. It bares at half tide. In summer it is largely surrounded by kelp, and at almost all times there is a break on it.

Nichols Bay (chart 8074), the entrance to which lies ¾ mile northward of Point Nunez, is a secure anchorage when once inside. The entrance is narrow, with outlying dangers, and in heavy southerly weather the sea breaks entirely across it. Inside the entrance the bay is comparatively clear. There are three anchorages in the bay, one in each of the three bights on the southwest shore; the middle one is the best; the first or eastern bight has rocks at its east entrance point that cover at three-quarters flood; the upper anchorage is small. At the head of the bay is a large fresh-water lake connecting with the bay by a rapid stream. At the entrance foul ground extends ⅜ mile northward from Point Nunez to mid-channel between the point and the bare rock (5 feet high) on the north side at the entrance. It is marked by kelp, and by breakers with any swell. West of the bare rock, and about midway between it and the north point at the entrance, is another kelp patch. There is kelp about 300 yards south of the bare rock.

To enter, bring the bay wide open, bearing 316° true (WNW ½ W mag.) and stand in between the kelp patches on this course slightly favoring the north point at the entrance, which is bold. Then follow a mid-channel course between the northeast shore and the islands on the southwest side. The narrowest part of the bay (about 75 yards wide) is 1 mile within the entrance, where the least depth is 7 fathoms.

Cape Chacon is the southeast point of Prince of Wales Island, and lies 23 miles northeastward of Cape Muzon. From eastward or westward the cape appears as three wooded, cone-shaped hills; from these the land rises, by a flat step, into a mountain which is conspicuous by its standing out alone. Westward of the cape the land is high and broken. A light is established on the cape. A ledge, bare at low water, extends ⅜ mile east-southeastward from the cape. The tidal currents have considerable velocity around the cape, northeastward with the flood and southwestward with the ebb, and it should be given a berth of at least ¾ mile.

Clarence Strait, lying eastward of Cape Chacon, is described on page 66.

Duke Island, on the north side of Dixon Entrance, between Clarence Strait and Revillagigedo Channel, is low and heavily wooded, and shows numerous round-topped hills from 250 to 500 feet high. **Mount Lazaro**, at its south end, is a solitary broad-topped mountain, 1,767 feet high, and the only part of the island visible at a distance of over 25 miles. The south and southeast sides of the island should be avoided, as rocks and reefs extend about 7 miles offshore. The farthest outlying are Hassler Reef, West Rock, Club Rocks, Yellow Rocks, and Barren Island.

Hassler Reef lies 7¾ miles 260° true (SW ½ W mag.) from Mount Lazaro. It is a sunken rock, covered by kelp, and is surrounded by very deep water close-to.

West Rock, lying 6¼ miles 227° true (S by W ⅝ W mag.) from Mount Lazaro, is two rocks about 100 yards apart, the northeast one about 12 feet high, the southwest one awash at high water. A sunken rock lies ¼ mile eastward and a kelp patch with a least depth of 12 feet lies ⅝ mile south-southeastward of West Rock.

Club Rocks, two in number, bare, about 15 feet high, and surrounded by reefs and kelp, lie 4¼ miles 173° true (SE ¾ S mag.) from Mount Lazaro.

Yellow Rocks, two in number, one much smaller than the other, of a yellowish color, the larger rock showing some vegetation, lie 7¼ miles 141° true (ESE mag.) from Mount Lazaro. They are 26 feet high and surrounded by kelp.

Vessels should not go inside the line of Hassler Reef, West Rock, Club Rocks, and East Island. These waters should be navigated with caution and every appearance of kelp should be avoided. It is also quite possible that isolated pinnacle rocks may exist that show no kelp. There is deep water on either side of Yellow Rocks and Barren Island.

Barren Island is a bare rock, 30 feet high, and lies 8½ miles 177° true (SSE ⅞ E mag.) from Mount Lazaro. There are other small rocks and some kelp quite near to it, but there is deep water within about ¼ mile in all directions. The island is marked by a light shown from the top of a steel tower 59 feet high. The light is 89 feet above the water.

West Devil Rock is a dangerous ledge in the northeastern part of Dixon Entrance, 14½ miles 97° true (ENE mag.) from Cape Chacon, 10 miles 240° true (SSW ¾ W mag.) from Barren Island, and 212° true (S ¼ W mag.) from Mount Lazaro. The highest part of the rock bares 10 feet at low water and foul ground, on which the sea breaks, extends ¼ mile southeastward from it. A shoal, on which the sea breaks almost continuously in moderate weather, lies ½ mile 356° true (NW by N mag.) from the rock, and a shoal of small extent, with 6 fathoms over it, lies 2¼ miles 142° true (ESE mag.) from it.

East Devil Rock, which bares 2 feet, lies about 3½ miles northwestward from the northeast end of Zayas Island. The channel between this rock and Zayas Island Reef is free from dangers.

McCulloch Rock is a pinnacle rock with a depth of 6 feet on it, lying 3¾ miles 274° true (SW by W ¾ W mag.) from the south

point of Zayas Island. Depths of 3 to 20 fathoms are found within 1¼ miles northward and eastward of the rock.

Celestial Reef lies 10 miles 153° true (SE by E mag.) from West Devil Rock. It is about 1 mile long and has three heads with 6 feet over them, one near its north end and two near its south end. The depths over the remainder of the shoal are 10 to 20 fathoms.

Tree Point lighthouse is situated on the northeast side of the lower end of Revillagigedo Channel, 3¾ miles northwest of **Cape Fox**. It is described on page 53.

Lord Islands, lying about 2½ miles east by south from Cape Fox, are in two groups, separated about ¾ mile, and have a number of islands in each group, the larger ones wooded and 100 to 200 feet high. There are sunken rocks and kelp close around these islands, with a clear channel between and eastward of the groups.

There are several bold, bare rocks about the Lord Islands.

Lord Rock, about 10 feet high, lies ¾ mile southwestward from the south group of the Lord Islands. A light, shown from the top of a steel tower, is established on the rock, and a red sector in Tree Point light also covers it and extends about ½ mile westward of it.

Fleece Rock, about 12 feet high, lies about ⅜ mile southeastward of the southern group of the Lord Islands.

Thistle Rock, about 10 feet high, lies about ½ mile west of the northern group of the Lord Islands.

Nakat Bay makes northward between Cape Fox and Tongass Island, a distance of 3 miles, with an average width of 2 miles; at its northeast end is the entrance to Nakat Inlet. The bay does not afford anchorage, but is the western approach to Port Tongass. **Craig Rock**, near the middle of the bay and ¾ mile west of Tongass Island, has 6 feet over it with deep water all around. It breaks in a heavy sea. **Tongass Reef**, on the northeast side of the bay and ½ mile northwestward of Tongass Island, is awash at highest tides. **Passage** and **Track Rocks**, lying between Tongass Reef and the north point of Tongass Island, cover at three-quarters flood.

Nakat Inlet extends in a north-northwesterly direction about 8 miles. The main inlet affords no anchorage. In the southeastern part of the inlet a chain of wooded islets separates it from **Nakat Harbor**, in the southern part of which, about halfway up the arm off a small bight having a gravel beach, anchorage and shelter may be found for vessels of moderate size in 18 fathoms. There is also anchorage in the northern arm of Nakat Harbor, but the shelter is not so good. **Observation Rock**, lying in the middle of Nakat Harbor, is about 6 feet high, with sunken rocks extending about 250 yards southeastward and northwestward from it. There is a deep channel between the rocks and the shore, but the shore must be given a berth of over 100 yards. A buoy marks the limits of the rocks extending southeastward from Observation Rock. The best channel for entering Nakat Harbor is southeastward of the southeasternmost islet of the chain separating it from Nakat Inlet.

Tongass Passage is a deep, narrow passage with steep shores forming the southeastern approach to Port Tongass. The entrance from southward is west of Haystack Island. **Dark Point**, the turning point from Tongass Passage into Port Tongass, has a bare rock about 5 feet high close-to.

Port Tongass (chart 8,074), is a small harbor about 400 yards wide, formed by the passage between Tongass Island and the mainland. **Tongass Island** is low, and except on the northeast side, has ledges and sunken rocks extending well out on all sides. Port Tongass is sometimes used as an anchorage but the bottom is hard, and with wind and changing tidal currents a vessel is liable to foul and drag her anchor. The anchorage is 200 yards from the northeast shore of the harbor in about 20 fathoms, hard bottom. The flood tidal current sets northwestward through the anchorage with a velocity of 1 to 2 knots. The anchorage may be entered by three channels, but that between Tongass and Kanagunut Islands should be used only by small craft at one-quarter flood or better. The main entrance is from southeastward through Tongass Passage, passing southwestward of Haystack Island. In rounding Dark Point to the anchorage keep the northeast shore aboard. In approaching from westward keep the Cape Fox shore aboard at a distance of ¾ mile on a 91° true (N by E ½ E mag.) course, and pass north of **Craig Rock**, and in mid-channel west and north of **Tongass Reef**, which lies at the northwestern entrance.

Lincoln Channel is the narrow passage between Kanagunut and Sitklan Islands. It is nearly closed at its northwest end by a bar with 9 feet over it and marked by kelp. A temporary anchorage can be had at its southeast end in 18 to 25 fathoms; it is open to southeast and south.

Winds.—In winter northerly gales occur at times, and draw down Portland Inlet and across the northeastern end of Chatham Sound, and when heaviest render the crossing from Dundas Island to Cape Fox hazardous for all except good-powered vessels. With southwest gales a heavy beam sea is encountered in making the crossing.

Currents, Dixon Entrance.—The flood current, coming from westward around Langara Island, sets along the north shore of Graham Island and across Hecate Strait for Brown Passage, spreading for about 15 miles around Rose Point and toward Edye Passage, where it meets the flood current from southward; consequently, in the northern part of Hecate Strait the tidal currents are irregular.

At Cape Muzon, the flood current sets around the cape northeastward and the ebb southwestward, with a velocity of about 2½ knots at strength.

South of Cordova Bay the flood current sets eastward with a velocity of 1¼ knots, and the ebb westward at the rate of 1¾ knots at strength.

At Nunez Rocks and Cape Chacon, the flood current sets around the cape northeastward and the ebb southwestward with a maximum velocity of about 3 knots at strength.

Between Cape Chacon and Zayas Island on the south and Duke Island and Cape Fox on the north, the tidal currents are much confused. In bad weather the heavy and confused sea sometimes has the appearance of breakers.

The turn of the current in the neighborhood of Rose Spit coincides approximately with the times of high and low water. At times the streams run as high as 4 knots in the neighborhood of Rose Spit, which causes heavy overfalls having the appearance of shallow water in depths of 10 fathoms and upward.

Between Dundas Island and Cape Fox the flood current sets eastward with an estimated maximum velocity at strength of about 2 knots and the ebb westward about 3 knots, and in crossing from Dundas Island to Cape Fox these currents should be kept in mind.

DIRECTIONS, DIXON ENTRANCE.

Because of the numerous dangers and uncertain currents, the navigation of Dixon Entrance at night, or in thick or foggy weather, is attended with some little risk. It is well to make Cape Muzon in the daytime, when, if the weather is clear, no difficulty should be experienced. In approaching from southward, the lighthouse and fog signal on Langara Island is a sufficient guide to the entrance. The unattended light on Cape Chacon is a good guide when in its vicinity, but Nunez Rocks, 3⅛ miles south-southwestward from the cape, should be kept in mind, as they are not marked. The unattended light on Barren Island is also a good guide when going to the eastern part of Dixon Entrance; it is advisable to set a course southeastward of the island in passing.

Courses.—From 1 mile southeast of Cape Muzon, an 86° true (NE by E mag.) course made good for 23½ miles leads inside of Nunez Rocks to a position 1 mile off Cape Chacon. Or, in thick weather, from 2 to 3 miles outside of Cape Muzon, a 91° true (NE by E ½ E mag.) course made good for 24 miles leads 2 to 3 miles outside of Nunez Rocks to a position 4 to 5 miles southeastward of Cape Chacon.

PEARSE AND PORTLAND CANALS

(chart 8051) together extend from Tongass Passage, near the northeastern end of Dixon Entrance, in a general north by west direction for about 82 miles and for that distance form the boundary between British Columbia and Alaska. Their waters are generally very deep from shore to shore, except at the lower end of Pearse Canal, where there are numerous islets and rocks, sunken and awash, at varying distances off the shore. The sides of the canals are bold, mountainous, and heavily wooded. Numerous small streams empty into them on both sides, and toward the head of Portland Canal the water is nearly fresh.

There are two principal dangers, in addition to the islets and rocks near the lower end of Pearse Canal. The first is a rock, bare at half tide, that lies off a bight on the east side of Pearse Canal, south of the entrance to Winter Harbor and a little eastward of midchannel. The other danger is a rock, bare at low water, that lies about ¼ mile off the west (Alaska) shore of Portland Canal, 2¼ miles above River Point.

Wales Harbor, on the British Columbia side of Pearse Canal, about 1½ miles from Tongass Passage, affords good anchorage in 15 to 18 fathoms, soft bottom; but its entrance is somewhat obstructed by islets and rocks. The usual anchorage is north of the larger island near the head of the harbor. In entering, follow the southerly shore at a distance of about 300 yards until past the shoal in the entrance to the harbor.

Fillmore Inlet joins Pearse Canal on the Alaska side at the southwest end of Fillmore Island, and separates that island from the mainland; it extends about 2 miles northward beyond the island. The inlet is comparatively free to navigation, but there are numerous rocks and reefs close inshore. The narrow entrance beyond the group of islets at the head of this inlet leads into two rocky basins in succession, each of considerable size. The inlet has no value as an anchorage. A small group of islets and reefs lies on the northwest side at its entrance.

Willard Inlet, having its entrance from the western side of Fillmore Inlet just within its entrance, is a narrow inlet extending into the mainland about 12 miles in a northwest direction. It is very narrow at the entrance, and the tidal currents have great velocity, forming swirls that extend well out from its mouth. The time of high and low water inside the inlet are about 1 hour later than at other places in the vicinity, and the rise and fall about 2 feet less. This inlet can only be entered at slack water and has no value as an anchorage.

Edward Passage separates Fillmore Island from the mainland northward and connects Fillmore Inlet with Pearse Canal. This passage is narrow, foul, and not navigable except for small craft.

Wales Passage, on the British Columbia side of Pearse Canal, opposite Edward Passage, is free from mid-channel dangers.

Winter Harbor, the entrance to which is 1¼ miles north-northeastward of Wales Passage, affords anchorage with ample swinging room for large vessels. The northern shore is bold, except where small sand spits make out at the mouths of streams. In entering, favor slightly the southern shore until past the first spit on the northern side, and then keep the northern shore best aboard when passing the bight on the south side to avoid a rock, awash at high water, lying about 75 yards off a small wooded islet.

Hidden Inlet, a narrow arm 5 miles in length, extends into the mainland in a north-northwest direction from Pearse Canal, about 8 miles south of its junction with Portland Canal. The entrance to this inlet is less than 150 yards wide, and through it the tidal currents set with a velocity of 8 to 10 knots, forming swirls that extend well into Pearse Canal. The main body of the inlet is about 3½ miles long, varying in depth from 30 to 70 fathoms, but there is only 5 fathoms at the entrance. It can be entered only at slack water, and is of no value as an anchorage.

There is a cannery on the south side of the entrance to Hidden Inlet. There is a rock with 10 feet over it about ¼ mile nearly straight out from the cannery dock and about 150 yards north-northeastward of the point southeastward of the cannery. Yentnoo Islets are a densely wooded and prominent divided islet, ⅜ mile southward of the point.

Sandfly Bay, on the Alaska shore, 14½ miles above Hidden Inlet, is of no value as an anchorage.

Halibut Bay, on the western (Alaska) shore of Portland Canal, 4 miles above Sandfly Bay, is 1¼ miles long and ½ mile wide at its entrance, narrowing to 700 yards. The bay is free from hidden dangers. Its shores are generally bold, but on each side near the entrance are sandy beaches about ¼ mile in length, with shoals extending 80 yards offshore and low grassy land running 100 yards

back. Near the head of the bay extensive flats, bare at low water, make out from the western shore nearly all the way across, leaving a narrow channel close to the east side, through which 6 feet can be carried at low water, to a narrow basin with 4 to 7 fathoms, and which is suitable only for small craft.

Anchorage for large vessels can be had in the middle of the bay, in 10 fathoms, a little over ¼ mile above the northeast point at the entrance, and abreast a rocky point at the north end of the sand beach on the west side, where the anchorage is 450 yards wide; also 700 yards farther up, abreast the north end of the sand beach on the east side, in 10 fathoms, where the anchorage is 300 yards wide.

Hattie Island, lying in mid-channel 6 miles above Halibut Bay, is 700 yards long north and south, and has some stunted brush growing on it. A ledge extends 250 yards northward from the north end of the island. Belle Bay, the bight east of Hattie Island, does not afford anchorage.

Tombstone Bay, on the west side of Portland Canal 7½ miles above Hattie Island, affords a temporary anchorage for small craft in 8 fathoms near the head of the bight at either end.

Maple Bay, on the east (British Columbia) side of Portland Canal, 8 miles above Hattie Island, affords fair anchorage for small craft, 300 yards from the southern side, in 8 to 9 fathoms. On the north side of the bay is a wharf and ore bunker.

Green Islets, two small, wooded islets on the eastern side 21½ miles above Hattie Island, are connected with the shore by a short spit bare at low water.

Ford Cove, on the eastern (British Columbia) shore just north of Green Islets, is a bight in the shore affording fair shelter from southerly, but none from northerly winds. A rocky ledge extends northward from Green Islets about 75 yards, partly showing at low water. The southern part of the cove is shoal for about 150 yards from shore. A fair anchorage, with sufficient swinging room, may be obtained in 16 fathoms, 400 yards from Green Islets and the eastern shore. Small craft can anchor closer inshore.

Lion Point, on the east shore, 3 miles below the head of the canal, is low and wooded, and has a grassy flat in front. The bight in the shore just south of Lion Point is filled by a flat bare at low water. A stream empties upon the flats, and comes from a narrow valley which runs back between high mountains about 2 miles. A buoy is established at the outer edge of the flat off Lion Point.

Salmon River empties on the western shore 1½ miles below Bear River, the two rivers being separated by a range of mountains 4,000 to 5,000 feet high. Extensive flats make out in a fan shape from the mouth of Salmon River, the northern portion of which extends quite halfway across the canal; these flats are covered at high water and are steep-to. The eastern edge is marked by buoys.

Bear River flows through an extensive wooded flat at the head of Portland Canal. The channels are subject to changes during freshets. The flats at the mouth uncover ½ mile and are very steep-to at the southern end. The southerly edge is marked by a buoy.

Portland is a small settlement on the Alaska side, near the head of the canal.

Stewart is a small settlement and post office on the British Columbia side, at the head of the canal.

Anchorage can be had in 25 to 30 fathoms near the head of the canal, ¼ mile from the east side, ⅓ mile below Bear River Flat, and with Eagle Point, the north point at the entrance to Salmon River, bearing 246° true (SW ¾ S mag.). Vessels should not go above the latter bearing, as the flat is uncovered only at low water and is very steep-to. The holding ground is good (soft mud), but the anchorage is unprotected, being exposed to northerly and southerly winds that draw through the canal.

Currents.—In the narrowest part of Pearse Canal the current has a maximum velocity of 3 to 4 knots. Elsewhere the estimated maximum velocity is 2 knots on the flood and 3 knots on the ebb, diminishing toward the head of Portland Canal. The current turns soon after the time of high and low water.

DIRECTIONS, PEARSE AND PORTLAND CANALS.

Pearse Canal should preferably be entered through Wales Passage or Portland Canal, but if coming from Tongass Passage the following directions with care will carry safely: A wooded island about 150 feet high lies in mid-channel between Safa Islands, in entrance to Wales Harbor, and Male Point. There is a patch of kelp off the west side of the island. Between the island and Safa Islands there is a rocky islet about 10 feet high, having a few scrubby trees on it. Entering Pearse Canal from Tongass Passage, pass in mid-channel between Point Phipp and the islands northwest of it, and then pass southward of the first wooded island (described above) in mid-channel between it and the islet, course about 69° true (NE ½ N mag). Then steer to leave two bare rocks (about 10 feet high, lying 1½ miles ahead and near the southeast shore) about 300 yards on the starboard hand, course about 74° true (NE mag.), and then follow a mid-channel course, keeping in mind the rock off the bight south of Winter Harbor.

In Portland Canal mid-channel courses lead clear of all dangers until near the head. In passing Salmon River Flat it is necessary to favor the eastern shore.

REVILLAGIGEDO CHANNEL AND TONGASS NARROWS.

Revillagigedo Channel (chart 8075) extends in a general northwesterly direction from Dixon Entrance for a distance of 42 miles to Tongass Narrows (chart 8094), the latter being a continuation of the channel for a distance of 13 miles to Guard Islands. The greater part of these waters have been examined by means of a wire drag, and the dangers are shown on the charts. From its entrance to Bold Island, Revillagigedo Channel is broad and comparatively free from dangers; the rocks lying nearest the tracks of vessels show out of water and are readily distinguished. Above Bold Island the channel is narrow in places, but the principal dangers are marked by buoys or lights, so that in clear weather no difficulty should be experienced in passing through.

Boat Harbor, about 1 mile eastward of Tree Point lighthouse, is a small cove forming a poor shelter for boats. It is badly exposed to southwest.

Tree Point is low and timbered. The shore is rocky and steep-to. Tree Point lighthouse is a white octagonal tower on a white octagonal building with a brown roof. The light is fixed white, 86 feet high, and visible 15 miles. A narrow red sector covers Lord Rocks. The light is not visible over the land between the bearings 158° true (SE ½ E mag.) and 318° true (WNW ⅜ W mag.). The fog signal is a compressed-air siren, blast 3 seconds, silent 27 seconds.

Foggy Point, 7½ miles northwestward of Tree Point, is a low, rocky, wooded peninsula. There is a reef awash at low water about 1,200 yards northwestward of Foggy Point. There are other kelp-marked rocks with 9 to 12 feet over them southeastward of this rock. Between these rocks and Foggy Point the depths are 5 to 7 fathoms.

De Long Islands is a group of several low, wooded islets lying between 2 and 3 miles northwestward of Foggy Point. Between them and the mainland the bottom is exceedingly foul.

Kirk Point, 4½ miles northwestward of Foggy Point, is a low, wooded peninsula. A kelp-marked reef, bare at low water, lies about 550 yards westward of the point.

Foggy Bay is a slight indentation in the shore between Foggy Point and Kirk Point, nearly divided into two parts by De Long Islands and the foul ground lying inshore from them. The northwest end of the bay is seldom used. At the head of the southeast end are two bights, either of which affords excellent anchorage for small craft. Care should be exercised in entering the easternmost bight, as there are rocks awash at low water on both sides near the entrance. Favor the north shore at high water.

Very Inlet, the entrance to which is on the northeast side of Foggy Bay 2 miles north of Foggy Point, is a narrow arm extending 3 miles in a north-northeasterly direction to a bay ¾ mile across, which connects by a narrow gut on the southeast side with a smaller bay. The first bay is frequented by small power boats and cannery tenders. About 1½ miles inside the entrance to Very Inlet there is a narrow arm on the southeast side, which leads to a large irregularly shaped bay. This bay can be entered with a draft of 8 feet at high-water slack, but at other times it is not navigable because of rapids in the narrowest part of the arm.

The entrance to Very Inlet is between a reef awash at high tide and a low wooded island. It is usually discernible during ebb tide by a strong current running out of the inlet. Favor the island shore in entering and keep in mid-channel as far as the entrance to the first arm. Then pass midway between a large, wooded, round islet and a small, grass-covered one westward of it. Just before entering the rapids pass westward of all islets, favoring the main shore slightly. Then keep in mid-channel.

House Rock, 480 yards west-northwest of Kirk Point, is a small bare rock 16 feet high.

Black Rock, 2⅛ miles west by north from Kirk Point, is a small bare rock 26 feet high surrounded by kelp. It is expected during 1917 to be marked by a light shown from a skeleton steel tower.

Snail Rock, ⅝ mile north of Black Rock, is a grass-topped rock, 28 feet high.

Between Black and Snail Rocks there are numerous rocks, sunken and awash, and the area should be avoided. A kelp patch having

a least depth of 17 feet lies ½ mile east by north (mag.) from Snail Rock.

White Reef is an extensive white, shell-covered reef, mostly covered at high water, which lies between 2 and 3 miles north of Black Rock and on the southeast side of the entrance to Boca de Quadra.

Slate Islands, on the northwest side of the entrance to Boca de Quadra, are a group of four low, wooded islands with numerous intervening rocks. The three northwestern islands are nearly connected at low water.

Kah Shakes Cove, a bight about 1½ miles southeastward of the entrance to Boca de Quadra, is a good anchorage for small craft. On the south side of the entrance are several islands and rocks, and on the northeast side are a few deserted shacks. Care must be exercised in entering because of the numerous rocks as shown on the chart. One-half mile north of Kah Shakes Cove is a long, narrow cove, which affords anchorage.

Kah Shakes Point, on the south side of the entrance to Boca de Quadra, is the termination of a low, broad, wooded peninsula extending north-northeastward for 1½ miles, whence the ground rises abruptly to an elevation of 1,955 feet.

Boca de Quadra and Behm Canal are described under separate headings on pages 60 and 62.

Ray Anchorage, a bight in the northeast side of Duke Island, affords shelter from southerly winds, but the bottom is hard and the anchorage is open northward. Anchor about midway between the rocky islet in the entrance to Morse Cove and the point ⅝ mile eastward, with the islet bearing 277° true (WSW mag.) in 10 to 15 fathoms, rocky and hard sandy bottom. There is deeper water nearer the islet.

Morse Cove has its entrance at the southwest end of Ray Anchorage. It is a land-locked harbor, with depths varying from 20 fathoms at its northeast end to 5 fathoms at its southwest end, but its entrance is very narrow and has a rock bare at half tide in the narrowest part on the southeast side of mid-channel; the channel on the northwest side of the rock is about 75 feet wide. Small craft with local knowledge can enter, but preferably at low tide. The entrance channel from Ray Anchorage is on the southeast side of the rocky islet in its entrance; a rock bare at low water lies midway between the islet and the western shore.

Reef Harbor is the name given to the indentation lying between Duck Islands and associated reefs on the east, and Duke Island (Grave Point) on the west. It is ¾ mile long and about ¼ mile wide, has prevailing depths of 23 to 25 fathoms, rock and sand, and is not well protected from eastward. Small craft, entering from northward and with care, can select temporary anchorage in 7 to 14 fathoms.

Pond Bay is described with Felice Strait.

Little Rock and **Whale Rock** are the extremities of a chain of rocks about 1 mile in length which lies 2 miles northeast of **Grave Point,** Duke Island. Their elevations above high water are 4 and 20 feet, respectively.

Bird Island, 1½ miles westward of Whale Rock, is about 20 feet high and bare.

Cat, Fripo, and **Lane Islands** are low and densely wooded. The greatest elevation of Cat Island is 190 feet. All of the islands are

surrounded by ledges extending from 100 to 200 yards from shore. Small craft sometimes anchor off the middle of the west side of Cat Island, but there is little shelter.

Danger Passage, between Cat and Mary Islands, has a least width of about 350 yards between the 3-fathom curves and is suitable only for small craft. Chart 8075 is the guide.

Mary Island is 4 miles long, 2¼ miles wide, comparatively low, and densely wooded near the shores.

Mary Island lighthouse is situated on the northeast side of the island. The structure is a white octagonal tower on a white building. The light is fixed white, 67 feet above the water, and visible 12 miles. A narrow red sector covers Twin Islands northwestward. The light is not visible over the land between the bearings 344° true (NW mag.) and 149° true (SE by E ⅜ E mag.). The fog signal gives a group of two blasts every 30 seconds (blast 3 seconds, silent 3 seconds, blast 3 seconds, silent 21 seconds).

Mary Island Anchorage is a bight in the north end of Mary Island between **Point Winslow** and **Giant Point.** It is a contracted anchorage with fair shelter from southeast and southwest winds, but more room and better protection can be had in Custom House Cove (see Felice Strait). Ledges with kelp extend about 150 yards north of Point Winslow and Giant Point, and the entire south side of the anchorage is shoal for 150 yards from the projections of the shore. The approach is clear. Anchor in 12 to 15 fathoms, hard sandy bottom, with Point Winslow bearing 108° true (E by N mag.), distant 350 yards.

Felice Strait is described under a separate heading on page 81.

Twin Islands, 1¾ miles northwest of Mary Island, are low and wooded, with deep water close-to in all directions, except a rock with 4 feet over it which lies 250 yards northwest of the northwest island.

Hog Rocks are the easternmost of a chain of islands, rocks, and reefs, which extend nearly 4 miles in an east by north direction from the shore of Annette Island. They are two principal groups of rocks, about 1 mile apart, showing about 6 feet at high water, the easternmost of which is marked by a light shown from a square concrete structure. A ledge with 14 feet near its end extends 600 yards eastward from the light. There is good water between the two groups of rocks and between the inner group and Walker Island. Small craft can pass between Walker Island and Lewis Island, or between Lewis Island and Ham Island, by avoiding the rocks shown on the chart.

Ham Island, 5½ miles west of the north end of Mary Island, is low and densely wooded. There is a deep channel along the entire north side of the island at an average distance from shore of 225 yards.

Cascade Inlet is a deep and narrow body of water, 2½ miles long, lying between Ham and Annette Islands. A narrow, crooked boat passage connects the inlet at its head with Revillagigedo Channel; small craft can find fair anchorage in mid-channel in the broadest part of this passage close to the west end of Ham Island.

Hassler Harbor is a bight on the north side of Annette Island, lying south of Bold Island. It affords excellent shelter for small craft in southeast gales with good holding ground. **Pow Island,** 400 yards in

diameter and 100 feet high to the tops of the trees, is in the bight; 400 yards west of Pow Island is a small grass-topped rock 10 feet high. The safest anchorage for vessels is 300 yards from this rock, with it and the middle of Pow Island in range. Small craft, with care, can go to the inner anchorage southeast of Pow Island.

Thorne Arm, having its entrance east of Bold Island and west of Cone Island, is 11 miles long and 1 mile wide at the entrance, opening out at the head to 3 miles. Its general direction is north-northeast, curving gradually to north-northwest. The arm is free from outlying dangers. **Cone Island** is dome-shaped and 450 feet high. A rock, with 17 feet over it and surrounded by much deeper water, lies ½ mile southwestward of Cone Island. There are a number of small wooded islands on the western shore of Thorne Arm near the head. At the head of the cove east of Mop Point, at the head of the arm, is a somewhat contracted anchorage in 18 to 20 fathoms, hard bottom. Anchorage can also be selected in the bight on the west side at the head between Snipe Island and Mop Point in 25 to 30 fathoms, soft bottom. A mid-channel course leads safely through the arm and to the anchorages. **Sealevel** is a mine on the east side at the head of Thorne Arm.

Moth Bay is a narrow indentation, 1½ miles long, on the west side of Thorne Arm just inside the entrance. In the middle of the entrance to the bay is a small wooded islet, and 300 yards above it is a rock. The channel leads on either side of the islet, and northeastward of the rock. Small craft can find good anchorage ¾ mile above the rock.

Coho Cove, 1¼ miles southwest of Moth Bay and opposite the east end of Bold Island, afford fair anchorage for small craft, although the depths are great. The best channel for entering is on the east side of the islet in the entrance.

Bold Island, 5½ miles west-northwestward of Hog Rocks light, divides Revillagigedo Channel. It is 2½ miles long, about 350 feet high, and wooded, and has several knolls somewhat above the general level of the island. The south shore of Bold Island is steep-to and there are no off-lying rocks. The passage north of Bold Island is seldom used by large vessels; its examination by means of a wire drag has not been completed.

Round Island, about 150 feet high and wooded, lies ½ mile northeastward of the eastern end of Bold Island, with two wooded islets between them.

Mastic Rock, awash at low water, lies ¾ mile westward of Round Island.

Spire Island is small, wooded, and about 160 feet high; there is a small islet at its east side. **Spire Island Reef**, lying ¼ mile northward of Spire Island, is covered several feet at high water. A light, on a square, concrete structure, is established on the reef.

Carroll Inlet, having its entrance 2 miles west of Bold Island, between Mountain and Carroll Points, extends northward 23 miles, with a width varying from ¼ to 1 mile. California Head separates it from George Inlet.

Gnat Cove is on the east side of Carroll Inlet 6½ miles above California Head and abreast the first good-sized island in the inlet. A fair anchorage can be had in the middle of the entrance to the cove in

17 to 18 fathoms, soft bottom. Foul ground extends 250 yards from the south point at the entrance to the cove. Small craft can stand into the cove about ⅜ mile and find a contracted anchorage near its head in 7 to 8 fathoms, hard bottom. In the main inlet between Gnat Cove and Island Point, a distance of 4 miles, there are depths of 20 to 50 fathoms, and anchorage in suitable depth can be selected with the aid of the chart. At its head the inlet narrows to ¼ mile, with depths of 27 to 35 fathoms, shoaling abruptly to the flat which extends nearly 1 mile from the head.

A mid-channel course carries safely to the flat at the head of the inlet, and also into Gnat Cove. The only place requiring more than usual caution is at a point 2½ miles above Gnat Cove, where there is a wooded islet 95 feet high in the middle of the inlet with a spur extending 300 yards from its northeast side, and a flat extends ¼ mile toward the islet from the mouth of a stream on the eastern side east-northeastward of the islet. There is a clear channel on the south and west sides of the islet.

Cutter Rocks, two in number, close together and covering at ¾ flood, lie on the west side of the entrance to Carroll Inlet ⅝ mile east by north (mag.) from **Mountain Point**; they are marked by a beacon. Except for foul ground, which extends 200 yards northward from the beacon, there is a clear passage between Cutter Rocks and Mountain Point.

George Inlet, joining Carroll Inlet from westward at California Head, has a length of 14 miles, a width of ½ to ¾ mile, and deep water throughout. There are a cannery and a shingle mill on the southwest side of the inlet, 3½ miles above California Head. A fair anchorage can be made in the cove west of Bat Point in 18 to 20 fathoms, hard bottom. Anchorage can be made in **Tsa Cove,** northeast of Bull Island, but its entrance, between Bull and Granite Islands, is narrow and obstructed by ledges.

A mid-channel course leads safely through the inlet and to the anchorage west of Bat Point. Tsa Cove is not recommended except with local knowledge. The entrance lies between Bull Island on the east and south and Bat Point and Granite Island on the west and north. The channel between Bull and Granite Islands is obstructed by a long, narrow ledge in the mouth of the cove in the north end of Bull Island and which nearly closes the channel, and by another ledge in mid-channel north-northwest of the northeast end of Bull Island. In passing these ledges Granite Island must be kept close aboard, and caution is needed.

Annette Bay, at the northwest end of Annette Island, is ¾ mile wide at the entrance and narrows to a small stream; it is 3½ miles long, has deep water, and does not afford anchorage for vessels; small craft can anchor near its head in 7 to 8 fathoms. Race Point, the north point at the entrance, is wooded and has a greatest elevation of about 150 feet. A ledge, which covers at high water only, extends 300 yards in the prolongation of Race Point; a course 500 yards off the point clears all dangers.

Nicholas Passage is described under a separate heading on page 83.

Potter Rock, nearly ¾ mile eastward of the east end of Pennock Island and 600 yards from the northern shore, is small in extent, has 16 feet over it, and is marked by a gas buoy on its northeast side.

Pennock Island is 3 miles long, ¾ mile wide, and divides the eastern end of Tongass Narrows into two channels. It is generally wooded and has a greatest elevation of 350 feet. Several rocky patches lie 250 to 400 yards from shore around the southeast end of the island. Otherwise the south shore of the island is steep-to, and the channel is clear if the island side be favored in the narrowest part of the channel.

California Rock lies nearly in mid-channel in the passage north of Pennock Island and ½ mile from its eastern end. The rock is small in extent, has 9 feet over it, and is marked by a buoy. There is a channel on either side of the rock, but large vessels usually pass on the north side, between it and Idaho Rock.

Idaho Rock lies 250 yards northward of California Rock, near the north side of the Passage. It has 12 feet over it and is marked by a float light.

Saxman is a small native settlement in the bight northward of Idaho Rock and 2 miles east of Ketchikan. On the point ⅜ mile west of the settlement are the ruins of a sawmill.

Ketchikan, one of the important towns in Alaska and the southernmost port of entry, is on the north side of Tongass Narrows abreast the western end of Pennock Island. It is the distributing point and center of the commercial and fishing industries of this part of southeastern Alaska. The principal station of the Standard Oil Co. in Alaska, a sawmill, several canneries, and cold-storage plants are located here. The headquarters of the Lighthouse Service, Immigration Service, and Forestry Service, and a relief station of the United States Public Health Service are located here.

Provisions of all kinds, ship chandlery, and coal in considerable quantities, fuel oil, distillate, and gasoline are obtainable. All kinds of repairs to small craft and minor repairs to large ones can be made.

There is frequent passenger and freight communication with Puget Sound and British Columbia ports, and with all towns in southeastern and southwestern Alaska. There is regular communication by small craft with points in Behm Canal, Nichols Passage, Clarence Strait south of Hadley, and by connecting transportation facilities across the portage at the head of Cholmondeley Sound to Sulzer and points on the west coast of Prince of Wales Island, and thence to Wrangell. There is also cable and radio communication with all points.

Anchorage may be had 200 to 300 yards off the steamer wharves and sawmill in 8 to 20 fathoms, sandy and rocky bottom. This anchorage is secure for all but the heaviest winter gales; the confined channel admits no sea, and the tidal currents do not exceed 1½ to 2 knots. Temporary anchorage in about 5 fathoms can be had on a rocky patch about 250 yards off the easternmost (Heckman) steamer dock.

A rock with 16 feet over it lies about 6 yards off the northwest corner of the Northland Dock.

Ketchikan Creek Flat fills the bight eastward of the sawmill at Ketchikan and extends 350 yards from shore. A dolphin marks its southeasterly extremity.

Pennock Reef, 600 yards westward of the west end of Pennock Island, is of small extent and bare at low water. A buoy marks its

western side. Another ledge extends 200 yards westward from the northwest end of Pennock Island.

A flat, mostly bare at low tide, begins ¾ mile westward of the docks at Ketchikan and extends along the north shore for 1½ miles. The outermost points, off **Bar** and **Charcoal Points**, are marked by buoys, the former being ¼ mile from shore. There is a cannery at the western end of the flat. The clear width of the channel off Charcoal Point is about 300 yards, and this is the narrowest point in Tongass Narrows.

East Clump, a wooded islet on the south shore nearly opposite Bar Point, is marked by a light. From East Clump to Lewis Reef shoals extend 50 to 200 yards from the south shore.

Lewis Reef extends from the south shore at Lewis Point nearly one-third the distance across the channel and is bare at half tide. It is marked by a light on a cylindrical pier 200 yards from the northwest end.

Peninsula Point is a wooded islet joined to the north shore by a gravel spit and marked by a beacon.

Ward Cove is a good anchorage on the north side of Tongass Narrows, 5 miles westward of Ketchikan. It is ⅜ mile wide at the entrance and wider inside. The anchorage ground is somewhat obstructed by **Bolles Ledge**, with a least depth of 6 feet, which lies 300 yards from the eastern shore, and is marked by a buoy. East Island, a wooded islet at the entrance, shut out by the west side of the bay, leads westward of the ledge. There are a cannery and fish by-products factory on the eastern shore, the former on the southeast side near the entrance and the latter eastward of **Bolles Ledge**. From the head of the bay a flat extends about ⅛ mile, through which a small stream comes in from a lake nearly 1 mile back. A mid-channel course leads safely into the cove; the shores are steep, and there are no dangers other than mentioned. Good anchorage can be had in mid-channel west of Bolles Ledge buoy in 12 fathoms, sandy and muddy bottom. An anchorage farther out may be taken if desired in 15 to 20 fathoms, sandy bottom.

West of Ward Cove and near the north side of the narrows is a group of small islands, more or less wooded, and rocks awash, all of which are mostly surrounded by ledges.

Channel Island is wooded, lies nearly in mid-channel, and has a good passage on either side, but that on the south side is generally used; it is marked by a light on the south end. A ledge extends 75 yards northeastward from the island.

Rosa Reef makes off nearly ¼ mile from a point on the south shore 1¾ miles westward of Channel Island, and is covered at highest tides. It is marked by a light. The bight east of Rosa Reef forms an indifferent anchorage; with the close proximity of Ward Cove it is not used. The eastern part of the bight is shoal for over ¼ mile from shore.

Pond Reef lies about ¼ mile from the north shore near the west end of Tongass Narrows. It is bare at half tide, usually surrounded by kelp during the summer months, and is marked by a buoy on the south side.

Vallenar Point is low and wooded and rises in a long easy slope to the high land of Gravina Island. A rocky patch, marked by a buoy,

lies ⅜ mile northward of the point. Close westward of the point are two wooded islets, and westward of them are three rocks awash at highest tides; there is no safe passage inside these rocks. The outer rock, called **Vallenar Rock,** has deep water close-to, but ⅛ mile southwest of it is a rock that covers at high water.

Guard Islands, two in number and close together, lying 1½ miles west-northwest of Vallenar Point and 10 miles from Ketchikan, guard the western entrance to Tongass Narrows. The western island is marked by a lighthouse and fog-signal station. A 3-fathom patch lies 200 yards northwest of the lighthouse. A rock, showing at low water and marked by kelp, lies close southeastward of the islands, and ⅜ mile east-southeastward is a large kelp patch, marking a reef, small portions of which show at low water. There is a passage on each side of the reef, but the one ¾ mile wide, between it and Vallenar Rock, is to be preferred.

Currents, Revillagigedo Channel.—East of Duke Island the flood current sets northward (true), following generally the direction of the channel, with a variable velocity, influenced somewhat by the wind, from 1 to 3 knots; at Twin Islands it receives the northern set from Felice Strait, and a slight set across the channel is sometimes experienced, due to the movement of the flood into Behm Canal. At the mouth of Carroll Inlet the ebb current, coming out from George and Carroll Inlets, divides, passing eastward along Bold Island and down Revillagigedo Channel and Felice Strait, and southward through Nichols Passage.

Currents, Tongass Narrows.—The ebb current sets both ways in Tongass Narrows, separating usually in the vicinity of East Clump; eastward it sets into Nichols Passage. The northerly set of the flood through Nichols Passage is about 2 knots, and is diverted westward into Tongass Narrows; in the narrows the tidal current is sometimes as great as 3 knots, but usually from 1 to 2 knots. In the narrows off Ketchikan the current turns from northwest to southeast 10 minutes after the time of high water at Juneau, and from southeast to northwest 20 minutes after the time of low water. The mean tidal current at strength is about ¾ knot, but during strong southerly winds there may be no southeasterly going current.

For directions through Revillagigedo Channel and Tongass Narrows, see table of courses, page 21.

BOCA DE QUADRA,

having its entrance on the east side of Revillagigedo Channel between Kah Shakes Point and Quadra Point, east of Slate Islands and 6 miles east-northeastward of Mary Island lighthouse, extends northward for 32 miles, with a uniform width of about ¾ mile, and general depths of 60 to 200 fathoms to the flat which extends ¾ mile from its head. The sides are steep-to and densely wooded, and there are no outlying dangers. Kite Island lies in the middle of the inlet 9½ miles above Kah Shakes Point. The inlet is used by vessels employed in the fishing industry connected with the cannery on Mink Bay.

Weasel Cove opens from the north side 7 miles from Kah Shakes Point. It affords anchorage ½ mile above the eastern point at the entrance in 17 to 19 fathoms. The entrance and anchorage are clear,

but vessels must keep clear of the flat which extends 700 yards from its head.

Badger Bay, separated from Weasel Cove by a promontory ⅓ mile wide, has 25 to 30 fathoms throughout its length, and there is a small flat at its head.

Vixen Bay, having its entrance south of Kite Island, affords anchorage at its head 2¼ miles from its entrance. The main channel entering is west of Gannet Island, lying in its mouth. Raven Island lies close to the east shore 1¼ miles from Gannet Island. There is a rock, visible only at lowest tides, 220 yards westward of Raven Island. Above and near Raven Island are three rocks visible at half tide, the outer one 250 yards south by east (mag.) from it. About 350 yards south by east (mag.) from the outer half-tide rock there is a rock with 2 feet over it and 7 to 20 fathoms close-to, and deep channels 200 yards wide between it and the half-tide rock and between it and the western shore. The anchorage is between the rocks off Raven Island and **Gosling Island**, which lies at the head of the bay. A ledge extends 175 yards northwest from the north end of Gosling Island.

A mid-channel course leads clear until approaching Raven Island. Then favor the western shore, and if the half-tide rocks are visible leave them 100 yards on the port hand on a 142° true (ESE mag.) course, and then keep the eastern shore aboard distant 250 yards. Anchor with the north end of Gosling Island bearing 171° true (SE ½ S mag.), distant ¼ mile, in 15 fathoms, bottom sand and broken shells. If the half-tide rocks are covered, after passing Raven Island keep the western shore aboard distant 150 yards, until the north end of Gosling Island bears 142° true (ESE mag.), when the sunken rock will be passed and the course can be changed eastward to the anchorage as above.

Mink Bay enters the south side of Boca de Quadra 2 miles above Kite Island, and has depths of 75 to 30 fathoms until near its head. Two small islands with deep water around them lie in the bay, Cygnet Island on the western side at the entrance and Grouse Island, near the western side ¼ mile from Cygnet Island. There is a cannery on the west side southwest of Grouse Island, and fresh water can be obtained at the wharf. The only anchorage in the vicinity of the cannery is on the rocky shelf midway between Grouse and Cygnet Islands, in 11 fathoms. Humpback Creek enters from eastward ½ mile from the head of the bay and carries a flat halfway across the channel. Above the flat is a secure anchorage ⅓ mile wide in 10 to 15 fathoms. A flat extends 700 yards from the head of the bay.

Marten Arm has its entrance 1½ miles north of the entrance to Mink Bay. It is ½ mile wide and 6 miles long, with depths of 70 to 100 fathoms until near the flat which extends ⅝ mile from the head. The arm is clear but has no anchorage.

The **tidal currents** have an estimated maximum velocity of about 1½ knots at the entrance to Boca de Quadra, diminishing toward the head.

Enter Boca de Quadra between White Reef and Slate Islands, heading about midway between Kah Shakes Point and Quadra Point, on any course between 86° true (NE by E mag.) and 97° true (ENE mag.). Thence follow mid-channel courses, passing either side of Kite Island, but preferably northward of it.

BEHM CANAL,

shown in part on chart No. 8105, borders the eastern, northern, and western sides of Revillagigedo Island; its eastern entrance, between Point Sykes and Point Alava, is about 5 miles north of Mary Island lighthouse. The western entrance of the canal, between Point Higgins and Caamano Point, is about 1 mile north of Guard Islands lighthouse; the distance from the eastern entrance to the western entrance, through Revillagigedo Channel and Tongass Narrows, is about 30 miles; the length of the canal from entrance to entrance is about 100 miles. The main channel of the canal is exceptionally free from dangers; the survey developed no sunken rocks or ledges that can not be easily avoided by a stranger in clear weather, but an examination by means of a wire drag has not yet been made.

There is a cannery on the eastern shore about 4 miles inside of Point Sykes.

Smeaton Bay enters Behm Canal from eastward 10 miles above Point Sykes and eastward of the southern end of Smeaton Island; it has an average width of ¾ mile and length of 11½ miles. There is a bay or cove 2 miles long in the eastern shore of Smeaton Bay about 7 miles above its mouth. The water in the bay is too deep for anchorage, but on the south side, at the entrance, between Carp Island and Short Point (the point eastward), a vessel can lie in summer in 19 fathoms water, hard bottom, protected from the summer winds.

Shoalwater Pass is a little tidal harbor on the eastern side of Behm Canal, between the mainland and Winstanley Island, and about 5 miles above the north end of Smeaton Island. The anchorage is land-locked, with depths from 15 to 20 fathoms, soft bottom, but it is suitable only for small vessels. Its entrance is from northward and is obstructed by a bar on which the depth is 10 to 15 feet. Its southern entrance is shoal, rocky, and very narrow, and is not recommended.

In approaching, **Entrance Island**, which is fairly bold, may be passed on either hand. If passing north of it, keep it aboard at a distance of about ¼ mile, taking care to avoid a rock, bare at low tide, lying ⅝ mile north-northwestward of Entrance Island. Pass in mid-channel between the high-water islet at the north end of Winstanley Island and Slag Point. Then favor the mainland and proceed with caution until up with the wooded island on the Winstanley side of the channel. Leave this island on the starboard hand and select an anchorage south of it.

New Eddystone Rock, 20 miles above Point Sykes, is a shaft 234 feet high, rising from a sand shoal in the middle of the canal, with deep water surrounding it.

Rudyerd Bay enters Behm Canal from eastward about 23 miles above Point Sykes and 3½ miles north of New Eddystone Rock; it is about 11 miles long and has a general width of about ½ mile. Two arms enter the bay from southeastward, the lower about 2 miles and the upper about 7 miles from the entrance. Near the head of the upper arm, and opposite a prominent landslide, is an anchorage in 20 fathoms, hard bottom; this is the only anchorage in Rudyerd Bay for moderate-sized craft. Small craft can find temporary anchorage near the edge of the flat at the head of each arm. The bay is free from dangers, as far as known.

Walker Cove enters Behm Canal from eastward about 10 miles above Rudyerd Bay entrance and abreast Snip Islands on the western shore. The cove is about 7 miles long and ½ mile wide and has great depths throughout, except at the entrance. A summer anchorage can be made in mid-channel on the inside of the bar between Hut and Ledge Points, at the entrance, in 10 to 20 fathoms; the bar has depths of 5 to 10 fathoms. A ledge extends 250 yards westward from Ledge Point, and a rock with 13 feet over it lies ¼ mile northeast of Ledge Point and 250 yards from the southeast shore; these are the only dangers in the cove.

Chickamin River enters Behm Canal from eastward about 5 miles above the entrance to Walker Cove. Large flats occupy nearly the whole of the bay at the mouth of the river and extend almost to the two points at the entrance from Behm Canal. The river is said to be navigable for skiffs some distance above its mouth, but it is crooked, the current is strong, and the portages are numerous. Small craft can find temporary anchorage near the edge of the flat.

Saks Cove is on the northeast shore of Behm Canal 10 miles above the mouth of Chickamin River. The cove is 1½ miles long and ⅜ mile wide and affords anchorage near its north end; there are no dangers, except the small flat at the northeast corner.

Fitzgibbon Cove is 2½ miles westward from the mouth of Saks Cove and 1½ miles southeast of the entrance to Burroughs Bay. It is a small but good harbor and easily entered. Follow a mid-channel course, passing east of **Center Islets** (wooded, in mid-channel ⅜ mile inside the entrance) and west of **Gibbs Rock** (bare, 15 feet high, east of mid-channel ⅜ mile above Center Islets). Anchor in the middle of the cove ¼ mile above Gibbs Rock in 11 to 13 fathoms, mud bottom.

Burroughs Bay enters Behm Canal from northward; it is 5½ miles long, 1½ miles wide, and clear. Unuk River enters the head of the bay from northward and Klahini River from northeastward; Unuk River is said to be navigable a considerable distance for skiffs. The head of the bay and mouths of both rivers are full of flats. There is no secure anchorage; temporary anchorage for moderate-sized craft can be selected on the east side just south of the flat of the Klahini River in about 30 fathoms. Small craft can anchor near the edges of the flats.

Anchor Pass is a narrow strait in the northwest shore of Behm Canal, about 6 miles southwest of the entrance to Burroughs Bay. There is good anchorage in this pass in 20 to 25 fathoms, muddy bottom; the holding ground is good. The northwestern entrance to Anchor Pass is shallow and rocky and can be used only by small craft with local knowledge.

Behm Narrows is the name given to a narrow clear part of Behm Canal about 8 miles long southwestward of Anchor Pass, and separating Bell Island from Revillagigedo Island.

Bell Island Hot Springs is a small health resort and store at the head of the cove at the southwest end of Bell Island. There is a small dock which goes dry at low water, but has deep water close-to.

Bell Arm, which extends northward from Behm Canal and at its head is joined by Anchor Pass, has good anchorage in the expansion at its head in 16 fathoms, soft bottom. Short Bay and Bailey Bay are two small, narrow bays entering the western side of Bell Arm.

Short Bay, the northern one, has good anchorage in 17 to 20 fathoms; a flat extends 300 yards from its head. Inland from Bailey Bay there is an area of hot springs.

From its western entrance between Point Caamano and Point Higgins, Behm Canal extends in a 15° true (N by W ¼ W mag.) direction for 25 miles, where it bends to the northeast for a distance of 5 miles and connects with Behm Narrows, described above. Between Point Higgins and Naha Bay, a distance of 10 miles, the eastern shore is fringed with large islands, the largest of which is Betton Island.

Clover Passage is the deep passage among the islands east and north of Betton Island leading to Naha Bay. Between the south end of Betton Island and Revillagigedo Island are two islands with a deep, clear passage between them, and a channel east of the eastern one. **Joe Island** has a deep though narrow channel on each side and is without outlying dangers. There are also deep passages between the islands north of Grant Island. Clover Passage is frequently used by vessels going to Naha Bay from Tongass Narrows. There are few dangers; these are shown on the chart (8124), and a mid-channel course carries safely. The usual route for small craft is between the two good-sized islands at the southeast end of Betton Island, east of Hump and Grant Islands, and the islands north of the latter. Cache Island, the northernmost, round and wooded and lying near the middle of Naha Bay, has deep water close-to on all sides.

Moser Bay is separated from Naha Bay by a group of three good-sized islands and three smaller ones lying north of Grant Island; it affords good anchorage. At the head of the bay are two islets with a flat outside them; the anchorage is in 20 fathoms, muddy bottom, abreast a white patch in a cliff on the south shore ¼ mile west-northwest of the outer islet near the head of the bay. There are clear passages between the islands that guard the entrance to Moser Bay.

Naha Bay (chart 8124) lies 11½ miles north-northeastward of Caamano Point. **Loring** is a post office and village on the north side near the head of the bay. It has a cannery and store, and provisions can be obtained. The cannery wharf has depths along its west face varying from 10 fathoms at its end to 10 feet close in. Water can be obtained through pipe and hose at the wharf. Communication is had with Ketchikan by small craft and telephone. The usual anchorage is just below the wharf, about 300 yards from the shore at the village in 17 to 18 fathoms, muddy bottom. The shore in front of the village should not be approached closer than 100 yards. The bight east of the wharf is partly dry at low water. Naha Bay and its approaches are clear. (See also Clover Passage, above.)

Helm Bay, entering Behm Canal from westward 5½ miles above Caamano Point, has a length of nearly 6 miles in a west-northwesterly direction, and a width at its entrance of 1¼ miles. On the south side, 4 miles within its entrance, is a small cove. There is anchorage in the entrance to the cove, also near the head of the bay, in 20 fathoms, muddy bottom. With heavy southeast gales a little sea makes in, but the anchorage is safe for well-found vessels.

A mid-channel course through Helm Bay carries safely to the anchorages. At 1¾ miles within the bay the channel leads between two wooded islands; from the one on the south side a reef partly

above water extends over ½ mile toward the entrance and terminates in an islet about 30 feet high. This islet and reef are left on the port hand in entering. Above the two islands are two wooded islands near the south side which are left in succession on the port hand in entering.

Port Stewart, on the west shore opposite Traitors Cove, has numerous islands and rocks; at its head is an extensive flat. There is no anchorage here except for small craft.

Traitors Cove enters Behm Canal from eastward about 15 miles above Caamano Point. The cove is about 7 miles long and varies in width from ¾ mile to about 80 yards. The strong tidal currents and rocks make navigation dangerous, and the cove should be avoided by a stranger; the upper part of the cove can be entered only by boats, and at slack water. There is a fair anchorage in a cove in the south shore about 2 miles above the entrance in 10 fathoms, hard bottom.

A sunken rock is reported to lie about 1½ miles westward of the entrance to Traitors Cove and 1¾ miles south-southeastward of Bushy Point, the position being uncertain.

Neets Bay enters Behm Canal from eastward about 19 miles above Caamano Point. The bay is 7½ miles long and 1 mile wide, but has no good anchorage. Temporary anchorage can be made in **Rockfish Cove,** on the south side 2½ miles within the entrance to the bay, in 25 fathoms.

Hassler Pass and **Gedney Pass,** both broad and clear, are on the east side of Behm Canal and separate Hassler Island from Revillagigedo Island. At the head of Gedney Pass is **Shrimp Bay,** and at the head of the latter is a good anchorage in 17 fathoms, soft bottom, suitable for vessels of moderate size.

The anchorage in the northern part of Convenient Cove is in 38 fathoms; on account of its depth and proximity to Yes Bay it is seldom used.

Spacious Bay is a broad bay in the west shore of Behm Canal, about 22 miles above Caamano Point. Square Island lies in the entrance near the southern shore; the channel southward of the island is not recommended. Near its head the bottom is irregular and the bay is not recommended as an anchorage.

Yes Bay (chart 8105, insert) enters Behm Canal from westward about 25 miles above Caamano Point. The bay is about 5½ miles long, ⅜ mile wide, and the entrance is free from dangers; there is a cannery, with about 25 feet alongside the wharf, on the northern shore about 2½ miles above the entrance. Good anchorage can be had in 15 to 30 fathoms, sticky bottom, in the first basin, a short distance above the cannery. The steamers that come here for fish, in good weather anchor in 12 to 15 fathoms, rocky bottom, before reaching the cannery. To make the anchorage stand into the bay favoring the northern shore to avoid a ledge, bare at low water, lying south of mid-channel ¾ mile below the cannery; in passing the cannery keep the northern shore close aboard until the basin opens out to avoid ledges, covering at high water, lying in mid-channel and connected with the southern shore.

A second basin, with depths of 10 to 13 fathoms, lies at the head of Yes Bay, and there is a Government hatchery on **Lake McDonald**

which is reached from here. Care is required to enter Yes Bay, and strangers should do so at low water. Near the middle of the first basin, 7/8 mile above the cannery, is a ledge with 7 to 12 feet over it, which is best avoided by keeping the north shore aboard at a distance of 125 yards while passing it. At 1 3/8 miles above the cannery a group of islands nearly close the channel, which is eastward of them, and this channel is further obstructed in its narrowest part by a ledge extending over halfway across from the islands. When passing this ledge the northeast shore must be kept aboard at a distance of not over 50 yards.

Currents.—The observed maximum velocities of the tidal currents in Behm Canal were 0.9 knot near the entrance to the eastern arm, and 1.3 knots in the eastern arm a little southward of the entrance to Saks Cove. From the observations made, the velocities in other parts of the canal were between 1/4 and 3/4 knot. The tides are said to meet near the entrance to Burroughs Bay.

DIRECTIONS, BEHM CANAL.

Entering from Revillagigedo Channel, a mid-channel course is, in general, good, passing either side of Smeaton Island, and 1/2 mile eastward of New Eddystone Rock. Give Point Whaley a berth of 1/2 mile or more in rounding it, and keep in mid-channel through Behm Narrows. Favor the western shore in the vicinity of Port Stewart in order to avoid the rock reported to lie 1 1/2 miles off the entrance to Traitors Cove.

CLARENCE STRAIT

extends in a 351° true (NW 1/2 N mag.) direction from Dixon Entrance for 45 miles to Guard Islands and the western entrance to Tongass Narrows and Behm Canal, and thence 328° true (NW by W 1/2 W mag.) for 67 miles to Sumner Strait. From its south entrance to Zarembo Island, a distance of about 100 miles, the channel is broad and comparatively free from dangers, and most of it above Guard Islands has been examined by means of a wire drag.

At Zarembo Island the strait divides. The channel eastward of the island, called Stikine Strait, is the route taken by vessels to Wrangell and Wrangell Narrows; that southward of the island, called Snow Passage, is used by vessels bound to Wrangell Narrows or westward through Sumner Strait, as it is more direct.

Sealed Passage, Felice Strait, and Nichols Passage are described on pages 80, 81, and 83.

Cape Chacon is described on page 45.

In the bight about 1 1/2 miles northward of Cape Chacon soundings of 18 to 20 fathoms occur about 1/2 mile offshore. Temporary anchorage can be made here in calm weather during fog or snow, or as a lee from southwest winds. The anchorage is due east from the first white beach south of the large landslide (partly overgrown) on the mountain south of Stone Rock. A kelp patch lies about 1/4 mile east from the landslide.

Stone Rock, 3 1/2 miles from Cape Chacon, is 20 feet high and bare. Two rocks awash lie 400 and 800 yards, respectively, southwest of Stone Rock.

McLean Arm (chart 8074) is a narrow inlet, 6 miles above Cape Chacon, 4½ miles long in a west-southwesterly direction. The south point at the entrance is low, but at a short distance back rises to a dome-shaped hill, 840 feet high. The north point at the entrance is a bare rock, 22 feet high, 100 yards southeast of a wooded island close to the main shore. The head of the arm has two branches. The southern and larger affords anchorage in its widest part in 20 fathoms, sticky bottom, with swinging room for a small vessel. Just above the anchorage and close to the southerly shore is a rock with two stunted trees. There is a small flat in the bight southeast of the islet; a flat extends ¼ mile from the head of this branch. At the entrance to the north branch, anchorage can be selected in about 17 fathoms; but it is less desirable, and care must be taken to avoid a ledge, bare at low water, which extends about 250 yards eastward from the point dividing the two branches. Large vessels can anchor at the head of the main arm in 28 to 30 fathoms, irregular rocky bottom. A mid-channel course will lead safely to the anchorage. The williwaws come down strong from the adjacent mountains. A small craft can find fair anchorage close under the southerly shore, about 3¼ miles inside the entrance. Fresh water can be obtained from several streams.

Gardner Bay (chart 8074), 7¾ miles northward of Cape Chacon, affords good anchorage when once inside, but its narrow entrance makes it suitable only for small vessels. The entrance to the outer bay is on either side of two closely connected wooded islets having a number of large, bare rocks at their southeast end. The channel south of the group is about 200 yards wide and has a depth of 12 fathoms. The entrance to the inner bay is south of the island choking the bay, and is but little over 100 feet wide, with a depth of 9 fathoms and bold shores; the passage north of this island is narrow and rocky with a least depth of 2½ fathoms. The anchorage is in the middle of the circular cove at the head of the bay, in 14 fathoms, soft bottom; the anchorage space is about ¼ mile in extent. In the bight on the south side of the anchorage are small flats and on the southeast side a half-tide rock, but there is deep water outside of about 75 yards from shore. A small craft can anchor close under the southerly shore, south of the island, in the middle of the bay inside the entrance. Fresh water can be obtained from several streams.

Kendrick Bay, 10 miles above Cape Chacon, extends 3½ miles in a 306° true (W ½ N mag.) direction with a width of about ¾ mile. Except for a reef in the middle of the bay 2 miles inside the entrance, it is free from dangers until near its head.

Three arms lead southward and southwestward from Kendrick Bay. South Arm is 2½ miles long, clear, and near its head affords good anchorage for small craft. Short Arm is 1¼ miles long and clear until ¼ mile from the head. West Arm is 2 miles long and foul for a distance of ½ mile inside the entrance, and should be entered preferably at low water. Enter south of the islets and steer about 311° true (W by N mag.), proceeding with caution. Good anchorage for small craft can be had near the head of the arm.

Kendrick Islands, on the north side of the entrance to Kendrick Bay, are a group of about 20 islands of varying sizes, and for the most part wooded. The highest and largest one has an elevation of

380 feet. Small craft with local knowledge can enter Kendrick Bay from northward by passing northwestward of all the islands, between them and the main shore.

Hidden Bay, 4 miles above Kendrick Bay, extends about 1 mile westward and then 1 mile southward. It is narrow, rocky, and little used except by an occasional small craft with local knowledge entering for anchorage, which is said to be the best afforded by any of the bays in this vicinity.

Ingraham Bay, 7 miles above Kendrick Bay, has not been fully examined and should be avoided by strangers.

Chichagof Bay does not afford an anchorage.

Menefee Anchorage lies inside the islands and reef off the south point at the entrance to Moira Sound, with its entrance between White Rock and that point. It is landlocked, but is small, with a very narrow entrance and irregular rocky bottom with from 2 to 40 fathoms, and should be avoided by strangers.

Moira Sound.—This body of water has its entrance on the west side of Clarence Strait 25 miles northward of Cape Chacon. The best entrance is between Adams Point and Moira Rock, from whence a mid-channel course through the sound should be followed. The soundings taken indicate generally deep water, but the sound and its tributaries have not been closely surveyed. There are several small indentations, islands, rocks, and reefs on the southern shore of the sound. At 8 miles from Moira Rock the sound divides. **Western Arm** has a length of 2½ miles, and then divides into two short arms. **South Arm** trends about south for 5 miles and has reefs bare at low water as shown on the chart; keep the west shore well aboard in entering.

There are several groups of islands across the entrance to Moira Sound, the two principal ones of which are **Moira Rock,** bare, 30 feet high, and marked by a light, and **White Rock,** which is the bare northeast face of the southeastern one of the two largest wooded islands. There is no passage into Moira Sound south of White Rock. Between Moira Rock and the first island southeastward are three kelp-marked rocks, awash at lowest tides. A kelp patch lies ⅜ to ½ mile north-northeast of White Rock, and a ledge bare at low water lies ¼ mile east-northeast of the rock. **Adams Point,** the north point at the entrance, is the eastern end of a high peninsula formed by the North Arm and Port Johnson.

Niblack Anchorage (chart 8074) is on the west side of Moira Sound south of the entrance to North Arm. Though a little out of the way and only about 400 yards wide, it is a secure anchorage in 6 to 12 fathoms, muddy bottom. The entrance is narrow, in one place only 100 yards wide, but the harbor is easily entered by steamers. At the head of the harbor is the Niblack mine. Several streams empty into the harbor.

Safety Rock is a grass-covered rock about 15 feet high lying in the middle of the entrance and westward of the group of wooded islands on the southeastern side of the entrance. There is deep water close to the northwest side of the rock. A ledge, bare at half tide, lies ⅝ mile 249° true (SW ½ S mag.) from Safety Rock; the channel usually followed by vessels is northwestward of Safety Rock and this ledge. The north side of the narrow entrance in range with

the red rock (and south shore) near the head of the harbor clears the ledge. A rock, with 2 fathoms over it, is reported to lie ¼ mile off the south shore ½ mile from the head of the harbor.

North Arm (chart 8076) is in the northwest side of Moira Sound 2½ miles inside Moira Rock. It is 600 yards wide at the entrance and nearly 5 miles long. There is a cannery and wharf in **Cannery Cove**, and an ore bunker and wharf on the north side of the arm near the head.

Deichman Island, 2 miles inside the entrance of North Arm, has foul ground between it and the shore northeastward, and foul ground extends 200 yards southeastward and southward from it. **Beck Rock**, 700 yards above Deichman Island and 400 yards from the southern shore, is covered at high water; its northeast and southeast sides should be given a berth of 200 yards. **Cannery Rock**, 1⅛ miles above Deichman Island and 300 yards off **Cannery Point**, is covered at half tide; a rock awash at low water lies nearly 200 yards east-southeastward from it, and a rock with 5 feet over it is reported to lie 100 yards south-southeastward from it.

Good anchorage in 15 fathoms can be had in Cannery Cove, on the west side of Cannery Point. Good anchorage for small craft can be had in the bight on the north side of the arm, ¾ mile inside of Point Halliday.

In entering, the track usually followed leads south of Beck Rock, north of Cannery Rock, and then close to the south shore for ¾ mile above Cannery Cove.

Port Johnson (chart 8076), on the west side of Clarence Strait between Adams Point and Wedge Islands, is a narrow deep inlet with a length of about 3½ miles in a 266° true (SW by W mag.) direction. There is anchorage, with scant swinging room for a small vessel, at its head in 13 to 23 fathoms.

On the north side of Port Johnson, 1¾ miles inside Adams Point, is a small arm ½ mile long, on which is the post office and mining camp of **Dolomi**. There is a store and two wharves; the southern wharf has depths of 6 to 12 feet; the northern wharf has a gridiron alongside it for unloading scows, and runs dry at low water. Anchorage, with scant swinging room for a small vessel, can be made off the southern wharf and eastward of mid-channel in 6 to 8 fathoms, soft bottom.

In entering, avoid a ledge, bare at half tide, which extends ¼ mile northwest (mag.) from Adams Point, and a rock with 17 feet over it, and marked by kelp, lying 1¼ miles north (mag.) from **Adams Point**. A mid-channel course carries in safely. The passage northwest of Wedge Islands is dangerous, except possibly for small craft at low water.

Wedge Islands are a group of islets and rocks lying 2 miles from the western shore in the middle of the bight northward of Adams Point. From Wedge Islands nearly to Chasina Point the western shore has rocky ledges extending out nearly ½ mile.

Chasina Anchorage (chart 8074) lies just inside Chasina Point, in Cholmondeley Sound; in rounding the point it should not be approached nearer than ½ mile to avoid a dangerous reef, bare at low water, lying about ¼ mile offshore northward and westward of Chasina Point. This anchorage is a lee from southeasters only, but

is convenient to the main channel of Clarence Strait; it is in 15 to 19 fathoms, rocky bottom, about ¼ mile from shore, with the west end of the largest island bearing between 30° true (N mag.) and 52° true (NNE mag.) distant ¼ to ⅜ mile.

Skin Island, low and wooded, is the west point at the entrance to Cholmondeley Sound. The island is about ½ mile long and on its west side anchorage is obtainable. The bottom is not uniform, being rocky, sandy, and muddy at intervals. From the south end of Skin Island a dangerous reef, bare at half tide, makes out one-third the distance to the point of the mainland lying south of it. The passage between the island and mainland carries 25 fathoms in its deepest part, but it is not particularly recommended.

Cholmondeley Sound.—This body of water is a deep inlet entering Prince of Wales Island between Chasina Point and Skin Island. Its extreme length is about 16 miles; it has several arms, all of which are deep and bold, and generally free from dangers, but the sound and its tributaries have not been closely surveyed.

Lancaster Cove is the northern one of two coves lying eastward of an island on the eastern side of Cholmondeley Sound. It is 300 yards wide and affords good anchorage in 13 to 14 fathoms. It can be entered on either side of the wooded island, ¼ mile long, in its entrance. A rock bare at one-quarter ebb lies 200 yards northward of the northwest end of the island, and a rock with a least depth of 21 feet lies 175 yards north-northeastward of the southeast end of the island.

Dora Bay, on the south side, about 8 miles inside the entrance to Cholmondeley Sound, may be used as an anchorage, but is not recommended. There is an irregular ridge across its entrance, the least water found on which is 9 fathoms. The anchorage at the head of the bay is in 25 to 35 fathoms.

There is a cannery and wharf at Sunny Point (entrance to Sunny Cove) on the north side at the head of the main part of Cholmondeley Sound, 9 miles inside Chasina Anchorage. A rock, bare at half tide, lies about 75 yards eastward of the wharf, well back of the line of its face, and a ledge from the rock extends nearly to the wharf. Fresh water can be had at the wharf. Small craft can anchor in the cove west of the cannery.

Chomly is a post office, cannery, and wharf on the south side of West Arm, 2¾ miles above Sunny Point. From the head of West Arm there is a planked road, about 3½ miles long, to the head of Hetta Inlet, by means of which communication is had with Sulzer and other points on the west coast of Prince of Wales Island.

Clover Bay is a small inlet 1¾ miles west-southwestward of Skin Island. The bay has not been thoroughly examined; it is probably a fair anchorage in 25 fathoms, but is open northeastward, and is not especially recommended. Off the southeast point at the entrance are a number of bare rocks close-to. A detached ledge, awash at lowest tides and marked by kelp, lies about 200 yards east of the northwest point at the entrance. The entrance is between the ledge and bare rocks. Inside its entrance the bay is clear to the island near its head.

Kasaan Bay is described under a separate heading on page 88.

South Vallenar Point, near the northwest end of Gravina Island on the northeast side of Clarence Strait, may be recognized by three bare rocks on its north side. Two ledges, about 300 yards apart, lie ¾

mile southward from the point. The northern ledge has 12 feet over it, the southern one is awash at lowest tides.

Vallenar Bay, lying between South Vallenar and Vallenar Points, affords good shelter from winds drawing up the strait. Close northward of South Vallenar Point are three low bare rocks about ¼ mile apart, with no passage southward of them. A mud flat, dry at low water, extends ½ mile from the head of the bay. Anchor in about 14 fathoms, with the two southernmost rocks in line, bearing 266° true (SW by W mag.), and Guard Islands in line with the high bank forming the northeast shore of the bay, bearing 342° true (NW ¼ W mag.).

Vallenar Point and Guard Islands are described on pages 59 and 60.

Street Island is a large rock with a single tree and about 10 feet high, which lies 9 miles west of Guard Islands and ⅓ mile from the western shore of Clarence Strait. The passage inside the island has been verified by means of a wire drag to a depth of 22 feet. Kelp extends a short distance from the ends of the island in the direction of its length.

Ship Island, 14½ miles above Guard Islands and ¼ mile off the northeast side of Clarence Strait, is 35 feet high, has a few scraggy trees, and is marked by a light. A ledge extends a short distance from the southeast end. Between the island and the main shore there is a depth of 25 feet, verified by means of a wire drag.

Lyman Anchorage (chart 8076), on the southwest shore of Clarence Strait 15 miles west of Guard Islands, is an open bight about 1 mile wide at its entrance and ¾ mile long. It is sheltered from southerly winds. Lyman Point, the eastern point at the entrance, is marked by a light; a rock, with 6 feet over it and marked by kelp, lies 200 yards off the point.

Lyman Rock, awash at lowest tides, lies near the middle of the anchorage, and is marked by a buoy on its north (mag.) side. At the south end of Lyman Anchorage there is a narrow arm, extending southward ½ mile, with a depth of 10 feet in the channel and affording a secure anchorage for small craft at its head in 6 to 8 fathoms.

Hadley is a post office and settlement on the southeast side of Lyman Anchorage; it has cable communication with points in Alaska and with Seattle. A wharf and ore bunkers for the mines southeast of the settlement are located here; the depth alongside the wharf is about 30 feet.

Meyers Chuck is a small harbor lying behind the islands just southward of Lemesurier Point on the northeast side of Clarence Strait. There is a landing and fish houses in the cove back of Meyers Island, the approach to which is between Meyers Island and the small island northwestward. Anchorage for small craft may be had in the narrow arm next to the mainland, about ⅛ mile northward of the landing. The approach to the anchorage is south of Misery Island, favoring the islands southward to avoid two rocks, bare at different stages of the tide, off the south end of Misery Island.

Ernest Sound is described under a separate heading on page 91.

Windfall Harbor, on the southwest side of Clarence Strait, about 4 miles above Hadley, is a small inlet, irregular in shape and obstructed at its entrance by reefs. It is used only by small craft.

Tolstoi Point, 9 miles above Hadley, is high, bluff, and wooded, and has a low, bare rock close to its north end and a similar rock at its southwest end.

Tolstoi Bay (chart 8124) has its extrance inside Tolstoi Point and extends in a general south-southeasterly direction for about 4 miles. At the entrance it is about ⅞ mile wide, narrowing to a little less than ½ mile at the anchorage. The eastern shore is high and steep; the head of the bay is flat, and the land is low and marshy. Near the eastern shore, at the head of the bay, is a wooded islet, and south of it is a line of islets and rocks, some of which are covered at high water. There is anchorage in about 10 to 15 fathoms in mid-channel westward of the wooded islet, protected from all directions except north-northwest, from which direction the wind and sea come home, making the anchorage uncomfortable. Southwest winds draw through strong. A reported sunken rock, marked by kelp, lies 150 yards off the point on the west side ½ mile northwest of the wooded islet at the anchorage. A mid-channel track leads to the anchorage.

On the west side of Tolstoi Bay, 1¼ miles inside the entrance, is a small harbor marked by a wooded islet 150 yards offshore. The entrance is obstructed by an islet in mid-channel and a rock that shows at low water on its southwest side, leaving a clear channel less than 100 yards wide on the northeast side of the islet. The harbor is nearly ½ mile long and ⅛ mile wide; the anchorage is in about 9 fathoms near the middle. In entering pass southward of the outlying wooded islet.

There is no safe passage inside the group of small islands lying close to the west point at the entrance to Tolstoi Bay, although entering from southeast, between sunken rocks, contracted anchorage will be found for small craft in 9 fathoms.

Thorne Bay has its navigable entrance on the north side of a large island obstructing its mouth, 2¼ miles west-southwest (mag.) from Tolstoi Point. It is about ⅜ mile wide and extends approximately south by west for 1½ miles, and then west-northwest 2½ miles farther. An inner arm, extending westward from near the head of the bay, is shoal and not navigable except by small craft at about high water. The bay has depths ranging from 6 to 9 fathoms, muddy bottom, and affords good anchorage. The bight south of the large island at the entrance appears to be a small anchorage in 15 fathoms, with a 12-foot channel leading from it into Thorne Bay.

In entering Thorne Bay pass close northward of the large island obstructing the entrance and then keep in mid-channel except at the turn up the northwest arm, when favor the south shore to avoid the point on the north side, which has a low shelving ledge making off from it.

Snug Anchorage affords a contracted anchorage in 12 fathoms in a small bight southeastward of the small island in the center of Tolstoi Bay. In entering keep the south shore at the entrance very close aboard.

Tolstoi Island, on the northwest side of the common entrance to Tolstoi and Thorne Bays and 2 miles west of Tolstoi Point, is low and flat with a few scrubby trees.

Narrow Point, 29 miles above Guard Islands, shows as a wooded knob just above the wooded shore in its vicinity and is marked by a light.

Ratz Harbor (chart 8124), lying 7 miles northwestward of Narrow Point, is a small anchorage but little more than ½ mile long and ¼ mile wide; it affords shelter from all winds except from north to northeast, and these probably blow home with some force. The northwest point at the entrance is a ledge with an islet near the shore, and two heads, each with a single scrubby tree, near its southeast end, all connected at low water. The outer head is marked by a beacon. From the southeast point at the entrance a ledge, covered only at high water, extends 130 yards northwestward. The width of the channel between is about 230 yards.

A careful mid-channel course carries in clear. A depth of 5 to 8 fathoms was found at the entrance, and 8 to 11 fathoms inside. The usual anchorage is in the middle of the southern part of the harbor. There is a flat in the northwest angle of the harbor; otherwise there are no dangers.

Dewey Anchorage (chart 8124), on the northeast side of Clarence Strait opposite Ratz Harbor, can be used as a summer anchorage, but the bottom is irregular and rocky, there are several dangers in the entrance, and the protection is poor. **Gull Point**, the northwest end of Onslow Island, is the southeast point at the entrance; a sunken rock lies 200 yards off the point, and a reef bare at lowest tide lies ⅝ mile southward of it. **Carlton Island** is the large island northeast of Gull Point; a shoal extends 350 yards southwestward from its western end. **Mabel Island**, ¼ mile in diameter, lies ¾ mile west-northwestward of Gull Point; a reef covered at half tide and without kelp lies ⅝ mile south of Mabel Island; a reef bare at half tide lies ¾ mile west-northwestward of Mabel Island, and a rock bare at half tide lies ¼ mile southwest of the reef. **Center Island**, 200 yards in diameter, lies midway between Mabel Island and the northern shore; rocky bottom with 4 fathoms lies 300 yards southward of Center Island, and with 4½ to 4¾ fathoms between the island and the shore northeastward; there may be less.

To enter Dewey Anchorage from southward, stand in on the line of the east sides of Mabel and Center Islands until abreast Gull Point, and then pass midway between Mabel and Carlton Islands. Anchor ⅜ to ½ mile northwestward of Carlton Island in 15 to 18 fathoms. From westward, pass ½ mile southward of Double Island and head for the north end of Center Island. When up with Center Island proceed with caution to the anchorage, leaving the island on either hand.

McHenry Anchorage has a clear width of about 700 yards and a length of about 1 mile from Avon Island to a small island at its head. It is sheltered except from southwest, and small vessels can anchor in the southeast part of the harbor with shelter from all winds. **Avon Island**, on the north side at the entrance, is small and wooded and lies close to shore; it should be given a berth of over 200 yards. **Sand Islet**, with a green bush on it, lies close to the southeast point at the entrance; a reef, bare at low water and showing kelp, extends ¼ mile west-northwestward from it, and a shoal extends 250 yards east-northeastward of Sand Islet.

To enter McHenry Anchorage keep Avon Island aboard, distant about 400 yards, and anchor in the middle, with Sand Islet bearing about 198° true (S by E mag.), in 9 to 12 fathoms. Or, a small

vessel can follow a mid-channel course and anchor 250 yards westward of the wooded island in the southeast end of the harbor, in 5 to 7 fathoms. A rock, with a depth of 10 feet over it, lies ½ mile southward of the western end of Avon Island.

The open water making eastward between Quartz Rock and Point Stanhope, up to a line joining Mosman Point and Point Stanhope, and to the mouths of the tributaries on the east and south sides, has been examined by means of a wire drag. The tributaries have not been closely examined.

McHenry Inlet, less than 2 miles above McHenry Anchorage, is about 4 miles long and 1 mile wide at the entrance. No sounding has been done in this inlet, but there is a deep channel and a good anchorage inside. The following directions with care will lead to the anchorage:

Numerous rocks and islets stretch across its entrance from the southern side. The northernmost islet is wooded and cone-shaped, and lies ¼ mile from the islets close to the northern shore. Approach this islet on a 104° true (ENE ½ E mag.) course, pass 75 yards northward of it, and then bring it astern on this same course. At 1½ miles inside the entrance islet, and in mid-channel, is a rocky islet with a few trees, and ⅜ mile southward of it and near the south shore is a bare rock. Pass between the rocky islet and the bare rock, and do not approach the islet closely as a ledge extends a short distance from it. Then keep southward of mid-channel for 1 mile and then keep in mid-channel. Anchor ½ mile below the point between the two coves at the head, favoring the eastern shore, in 20 fathoms, soft bottom.

Burnett Inlet, about 3 miles northwestward of McHenry Inlet, makes into the island north-northwestward for about 7 miles, with an average width of less than ¼ mile. Several dangers, awash and submerged, some of they buoyed, lie at the mouth of this inlet, but for the greater part of its length it is apparently free from dangers. About 4 miles from the entrance a few soundings were taken of 3 to 5 fathoms; outside of this the water seems to be much deeper. The head of this inlet connects by a low portage, ¼ mile wide, with the head of Anita Bay entering the island from northward. Chart 8160 is the best guide for the inlet. There is a cannery on the point on the west side of the entrance to Burnett Inlet, and there is a depth of 19 feet at the wharf. The depths are too great for anchorage in the vicinity. Small craft can anchor in the cove just northwestward of the cannery, the clear width of which is about 150 yards and depths 7 to 8 fathoms.

Mosman Inlet, nearly 2 miles southwestward from Burnett Inlet, makes northwestward into the island for about 6 miles, with an average width of a little more than ¼ mile. This inlet has not been sounded, but it appears to be free from dangers, only one low-water rock having been seen near its mouth on the northeast side.

Between Mosman Inlet and Point Stanhope is **Rocky Bay**, thickly studded with rocky islets and sunken rocks; only one rock, and that having a depth of 3 feet over it, was discovered outside the line joining the points at the entrance, but as no soundings were taken inside the entrance it would be well to approach this bay with caution. A large lake, called Streets Lake, has its outlet in the middle bight, at the head of Rocky Bay.

A rock with a depth of 6 feet over it, and marked by a buoy, lies ¾ mile southward of Point Stanhope.

Between Point Stanhope and the south end of Etolin Island is a large group of islands, between which several passages are available for small craft bound to Rocky Bay. The best passage, having its entrance 1½ miles northward of Point Stanhope, has a depth of about 5 fathoms, but leads close to several dangers, and should not be attempted by strangers.

The shore of Etolin Island from **Point Stanhope to Point Harrington** is fringed with numerous wooded islands and rocks, which have been accurately located. Vessels should give the shore a berth of at least 1 mile and pass outside of Lincoln Rock lighthouse. There are passages inside the islands available for small craft, but on account of the many dangers they should not be attempted by strangers. The best anchorage available for boats of 4 feet draft is in a cove locally known as Johnson Cove, inside of an island ½ mile northeastward of the north end of the Screen Islands. The entrance is from southward, and is obstructed by several rocks awash.

Lincoln Rock light stands on Lincoln Rock, ½ mile westward of Abraham Islands (150 feet high and wooded) and 1 mile from the northeast shore of the strait, with no safe passage for large vessels between. The fog signal is on a small islet ¼ mile northeastward of the lighthouse.

Steamer Bay (chart 8154), on the north side of Point Harrington, affords anchorage at its head, but the holding ground is not good and southeast winds draw with considerable force through the creek at its head. It is open northwest. The bay is 1 mile wide at its entrance, gradually contracting near its head to ⅛ mile, then again widening into a basin ¼ mile in diameter, into which a creek empties. One-half mile westward of Point Harrington is a pinnacle rock with 21 feet over it and marked by a buoy. For a distance of 1¼ miles from Point Harrington, both shores of the bay have some rocks close inshore.

The bay is easy of access, a mid-channel course leading fair into the inner basin. The best anchorage is probably a little east-southeast of the middle of the basin in about 16 fathoms, though small craft may find better bottom by anchoring in 10 fathoms closer to the eastern shore. A bare rock, 3 feet high, lies near the shore on the northeast side of the basin.

Coffman Cove (chart 8162) lies on the western side 5 miles southwestward of Lincoln Rock light. It is about ¾ mile long and ¼ mile wide. The western half of the cove is filled with rocks, some of which are bare at low water. Good anchorage for small craft may be had in the middle of the southeastern half in 10 to 15 fathoms, muddy bottom, and a mid-channel course will carry in safely. A flat extends about ¼ mile from the southeast end of the cove.

Kashevarof Passage, connecting Clarence Strait and Sumner Strait lies southwest of the Kashevarof Islands. This passage is wide but is beset with rocks, reefs, and shoals, with strong tidal currents and tide rips, and should be avoided by strangers. Kashevarof Islands are low and wooded though there are many small bare rocks.

The main channel, leading between Beck Island and the Triplets and as far west as West Island, has been examined by means of a

wire drag, and the dangers are shown on the charts. The section from West Island to Fire and Echo Islands has many dangers and has not been closely examined, but there is an apparently clear channel leading between the northern end of West Island and the sparsely wooded rocky islet ¼ mile westward, thence eastward of the wooded islet ⅞ mile eastward of the southern end of Exchange Island, thence between Exchange Island and the double island northward and inside of Fire Island, thence either northward between Bushy Island and Tide Island, or between Tide Island and Rookery Islands.

Exchange Cove, on the eastern side of Prince of Wales Island southward of Fire Island, is about ¼ mile wide and 1 mile long, and is the largest sheltered anchorage in this vicinity. It has room for several small vessels, and is well protected from all directions. The depths are 10 fathoms at the entrance, shoaling gradually toward the head.

Lake Bay (chart 8162) lies on the southern side of Kashevarof Passage between Stevenson Island and Coffman Island, a distance of 3½ miles, and is about 2¾ miles long. At its southern end, about 2½ miles southwestward of Coffman Island, is a cannery and wharf with 3¼ fathoms at its end. Fresh water can be obtained from the cannery. There is good anchorage 150 to 300 yards northwestward of the wharf in 10 to 12 fathoms.

There are detached islands and reefs across the entrance and in the bay, and the best channel is from northeastward between Beck and Coffman Islands. **Beck Island**, small and wooded, lies ⅞ mile west-northwestward of Coffman Island and is marked by a light. **Gull Rock** and **Barnacle Rock**, awash at highest tides, lie ⅝ mile southward and southwestward, respectively, from Beck Island; they should be given a berth of over 300 yards. There are also extensive sunken reefs between Beck Island and **Bush Rock**. The latter lies ⅝ mile off Stevenson Island, is 35 feet high, and has bushes on top. Abreast **Keg Point** (on Stevenson Island ⅝ mile northward of the cannery) the channel is about 250 yards wide between an extensive shoal (marked by a buoy) making out from the shore northeastward of the cannery and a shoal making out 175 yards from Keg Point.

To enter Lake Bay, pass ½ mile northwest of Coffman Island, and about 350 yards southeast of Beck Island and southward of a red buoy marking an 18-foot rock, and steer 258° true (SW ¼ W mag.), passing midway between Gull Rock and Barnacle Rock. Continue the course until about 400 yards from the western shore (Stevenson Island), and then steer 188° true (SSE mag.) for the cannery with Bush Rock astern, passing Keg Point at a distance of 250 to 300 yards. Anchor with the wharf bearing southeast, distant 150 to 300 yards, in 10 to 12 fathoms.

Whale Passage, leading westward of Thorne Island, has many rocks, sunken and awash, and is suitable only for small craft with local knowledge.

Key Reef is a large reef lying about 1¾ miles from the Kashevarof Islands. The northern end of the reef, lying 3½ miles southwestward of Point Harrington, usually shows at high water as two rocks about 5 feet high and about 100 yards long, but they are awash at extreme high tides and are marked by a light. A number of low-water

rocks lie near Key Reef; one lying ¾ mile east-southeastward covers at three-fourths flood.

Nesbitt Reef is a dangerous reef extending ¾ mile southeastward from Point Nesbitt. Near the outer end of the reef is a rock covering at three-quarters flood. There are rocks bare at low water a short distance outside it and a string of rocks between it and the shore, which cover at various stages of the tide. The tidal currents have considerable velocity in its vicinity and care should be taken, especially in foggy weather, to avoid it. In going westward, when Point Nesbitt bears north distant 1 mile, the reef will have been passed. Shoals with 5½ to 10 fathoms over them have been found northeastward and eastward of the reef.

Snow Passage (chart 8160) lies between Bushy Island, the northernmost of the Kashevarof group, and Zarembo Island. It is a deep channel about ½ mile wide, with foul shores and strong tidal currents. Snow passage is largely used by vessels bound from or to Wrangell Strait or between Clarence and Sumner Straits and not desiring to touch at Wrangell, as it is shorter than the route through Stikine Strait. It has been examined by means of a wire drag and is clear in mid-channel, except for a shoal with a depth of 26 feet in the middle of the channel northward of Rookery Islands. The shoals in Snow Passage are clearly marked by kelp at slack water. Anchorage for medium-sized vessels, well sheltered from all winds except west and northwest, may be had in the cove on the north side of Bushy Island in 10 fathoms. There are two rocks awash on the southwest side and a 3-fathom spot, marked by kelp, in the center of the entrance. Enter midway between the 3-fathom spot and the point on the northeasterly side.

The shore of Zarembo Island from Point Nesbitt to Macnamara Point has **ledges** extending off in places about ¼ mile, nearly all of which are bare at low water; those abreast the bare rocks close to the middle of the east side of Bushy Island are always covered and are marked by kelp at slack water. From Macnamara Point to St. John Harbor the shore is fringed with ledges to a distance of ½ mile in places, with broken ground farther out, and this shore should be given a berth of 1 mile or more.

A **rock** bare at low water lies about ¼ mile from the north shore of Shrubby Island and about 2 miles west-southwestward of Point Nesbitt.

At the southeast end of **Bushy Island** is a bare rock ¼ mile from shore, from which a covering ledge extends ¼ mile south-southeastward. The bare **black rocks** close to the middle of the east side of Bushy Island are several feet high. On the east side of the channel at the north end of Bushy Island is a large patch of **kelp** showing at slack water, which extends nearly 400 yards from the Zarembo Island shore; inside the outer edge of the kelp are two rocks covered at half tide. There is a red buoy outside the rocks. A light marks the west side of the passage at the north end of Bushy Island.

The **currents** of Snow Passage somewhat resemble those of Seymour and Sergius Narrows in their peculiarities. The tides from Sumner Strait meet those from Clarence Strait in the vicinity of Key Reef. Slack water occurs in Snow Passage between one and two hours before high and low water. This fact makes the current on the last

1½ hours of the rising tide and the first 4½ hours of the falling tide set westward, and the current on the last 1½ hours of the falling tide and the first 4½ hours of the rising tide set eastward, through the passage. The east-flowing current has a maximum velocity of 3 to 5 knots and the west-flowing current 4 to 6 knots in the narrowest part of the passage. Swirls, of some severity at times, occur from abreast Ossipee Channel to the north end of Bushy Island; westward of the last-named point they are very much lessened.

At the northwest end of Kashevarof Passage the currents are similar to those of Snow Passage, but their velocity is greatly reduced.

Ossipee Channel, between Shrubby and Bushy Islands, has not been dragged, but an examination by means of the lead indicates a clear channel. Thick kelp and ledges line the channel on both sides, but the mid-channel is apparently clear.

Rookery Islands, two in number, about 150 feet high and wooded, lie in mid-channel near the northwest end of the passage and 1¾ miles south-southwestward of Macnamara Point. There is a bare rock and ledges that cover between the islands, and close west of western Rookery Island are two islets, having each a clump of trees.

Salmon Bay lies 1¼ miles southwestward of Rookery Islands. Small craft can find sheltered anchorage in 1 to 3 fathoms near the head. It is extensively used as a harbor by local boats during certain seasons of the year.

A line of detached rocks 1¼ miles long, bare at different stages of the tide and marked by kelp at slack water, lies about midway betweeen Rookery Islands and Point Colpoys and from ¼ to ⅝ mile offshore. The channel leading along the shore southwestward of them appears to be clear, but has not been closely examined.

For courses through Snow Passage, see table of courses, page 24.

Stikine Strait is the northern branch of Clarence Strait, connecting it with Sumner Strait and the waters off the mouth of Stikine River. The strait is broad and deep, and is generally used by vessels going to Wrangell, or following the Inland Passage from Clarence Strait to Wrangell Strait. Both shores of Stikine Strait are free from danger except at a few points, and all dangers are shown on the chart. The strait has been examined by means of a wire drag. Directions are included in the table of courses on page 21.

Quiet Harbor lies on the southeast side of Stikine Strait south-southeastward of Round Point, Zarembo Island. A small vessel can find anchorage just inside its entrance in about 20 fathoms, soft bottom, with scant swinging room.

Chichagof Pass, between Etolin and Woronkofski Islands, is about 5 miles long and varies from ¾ mile to 2 miles in width. It has been examined by means of a wire drag and found clear except for **Young Rock**, at the eastern end of Chichagof Pass in Zimovia Strait, which has a depth of 17 feet over it and is not marked by kelp.

Wrangell Harbor (chart 8154) lies on the west side of the northern end of Wrangell Island, 1 mile below Point Highfield; it is a bight formed by Point Shekesti, which projects ⅜ mile in a northwesterly direction from the island. As an anchorage it affords shelter only from offshore winds. During heavy southeast winter gales Highfield Anchorage is sometimes used for better shelter. A reef, bare at low

water, lies 100 yards north of the extremity of **Point Shekesti.** The recommended anchorage for large vessels is in 18 to 20 fathoms, sticky bottom, on the following ranges: The smokestack of the sawmill slightly open southward of the steeple of a church bearing 73° true (NE ¼ N mag.); the cannery northwest of the town in line with the point ½ mile northward of it. Small craft anchor nearer the head of the harbor.

Wrangell is a post office and port of delivery on the north side of Wrangell Harbor. There is a sawmill in the eastern part of the town and a cannery and wharf at its northwestern limit. There are two wharves, besides the cannery wharf, the western one of which has ample depths at the end for deep draft vessels; water can be had at both wharves. The sawmill wharf is dry at lowest tides. Coal in small quantities is sometimes kept on hand, and gasoline, distillate, provisions, and fishermen's supplies can be obtained. Minor repairs to the hulls and machinery of small craft can be made. Light-draft river steamers make irregular trips up the Stikine River from Wrangell during the summer months, and a small local vessel plies to points on the west coast of Prince of Wales Island. There is cable communication with the principal points in Alaska and with Seattle; there is also radio communication with limited transmitting radius.

Highfield Anchorage is at the north end of Wrangell Island, 1½ miles from Wrangell Harbor. The anchorage is in 12 to 15 fathoms, muddy bottom, just westward of the line of, and about midway between, Point Highfield and Simonof Island. Light floating ice from Stikine River is encountered here in the spring, and counter currents render a vessel very uneasy at times. On the south side, ¼ mile eastward of Point Highfield, is a cannery.

City of Topeka Rock, in Highfield Anchorage about 100 yards west-northwestward of the cannery wharf, is awash at low water, and is marked by a buoy.

Currents, Clarence Strait.—The flood current sets northwestward through Clarence Strait, and the ebb in the opposite direction, as far as Key Reef, following the general trend of the channel. At Nunez Rocks and Cape Chacon the flood current sets northeast around the cape and the ebb southwest with a maximum velocity of about 3 knots. South of the line of Cape Chacon the tidal currents are much confused. In the wide portion of the strait from Cape Chacon to Bronaugh Islands, the flood current has an estimated maximum velocity of 1½ knots and the ebb 2 knots; from Bronaugh Islands to Grindall Island, the estimated maximum velocities are 2 knots on the flood and 2½ knots on the ebb; above Grindall Island the estimated maximum velocity on the flood is 2 knots and the ebb 2½ to 3 knots.

In general the currents in the strait set directly in and out during flood and ebb, except in the vicinity of the entrances to the estuaries, where a slight set across the channel may be experienced setting to or from them, especially the large ones; and along the shores of the strait where it is either slack or there is a small counter current. The most noticeable of these counter currents is at Dewey Anchorage and among the islands at Onslow Point, where it has considerable velocity (from 2 to 3 knots), and sets directly opposite in direction

to the current in the strait. This counter current meets the main current at the entrance of the large bay east of Point Stanhope, and is confined to the bay and the immediate vicinity of the shore southeastward.

In Stikine Strait the flood current sets northward through the strait until met by the current from Stikine River west of Wrangell Harbor. In the strait the velocity of the current is 1 to 1½ knots on the flood and 1½ to 2½ knots on the ebb. The glacial waters of the Stikine River usually discolor all the water in the vicinity of Wrangell Harbor.

For directions through Clarence Strait, from Tongass Narrows to Wrangell, see table of courses, page 21.

SEALED PASSAGE

(chart 8075) is an approach to Felice Strait from Clarence Strait and lies between Duke Island on the east and Percy Islands and Hotspur Island on the west. On the southeast side of the southern end and extending 5 miles south-southwestward from **Point White**, the southwestern point of Duke Island, there are numerous rocks, sunken and awash, of which Hassler Reef and the **Bee Rocks** are the outermost.

Hassler Reef has a least found depth of 20 feet and is marked during the summer months by a heavy growth of kelp. It lies 5¼ miles 215° true (S ½ W mag.) from Point White.

West Bee Rock, covered at half tide and with a heavy bed of kelp extending ½ mile northwest of it, lies 1⅜ miles north (mag.) from Hassler Reef and 4 miles 217° true (S ⅝ W mag.) from Point White. **East Bee Rock** has two heads, covered at three-quarters tide, lying 1¼ miles northeastward of West Bee Rock.

A rock, with 3 feet over it at low water, lies 1⅞ miles 19° true (N by W mag.) from West Bee Rock.

Percy Islands are a large number of low wooded islands, about 3 miles long in a north-northeast direction, on the northwest side of Sealed Passage; the southernmost is 270 feet high. The passages between these islands are not navigable except for very small craft with local knowledge. Anchorage for these can be had either northward or westward of the southernmost island.

Sealing Reef is a double-headed rock, bare 5 feet at low water, lying about 1 mile 106° true (ENE ¾ E mag.) from the southern extremity of Percy Islands.

A pinnacle rock, not marked by kelp, on which the least found depth is 28 feet, lies 1½ miles 100° true (ENE ¼ E mag.) from the southern extremity of Percy Islands. The depth may be less.

Another group of rocks, some of which show 6 to 8 feet at high water, lies opposite (west by south, magnetic) from Point White. distant 1½ miles.

Werlick Island is low and heavily wooded.

Hotspur Island is heavily wooded and has a greatest elevation of 290 feet near the northern side.

Vegas Islands, lying about ½ mile off the Duke Island shore, are 160 feet high and heavily wooded. Between them and Duke Island are several rocks.

DIRECTIONS, SEALED PASSAGE.

A 47° true (N by E ½ E mag.) course, with the northwest side of Vegas Islands just open of Annette Point, until the south end of Hotspur Island is abeam, will clear all dangers but passes within about 175 yards of the 28-foot pinnacle rock lying 1½ miles 100° true (ENE ¼ E mag.) from the southern extremity of Percy Islands.

FELICE STRAIT

(chart 8075) extends from Clarence Strait to Revillagigedo Channel, between Duke, Cat, and Mary Islands on the southeast and Annette Island on the northwest. It offers the most direct route for vessels from the southern end of Clarence Strait to the eastern arm of Behm Canal, but is little used. There are several dangers but, with the exception of Indian Rock, those lying nearest the sailing line either show above water or are marked by buoys, and no difficulty should be experience in making the passage through the strait in daytime and with clear weather.

Point Percy, the southwesternmost point of Percy Islands and on the southeast side of the southwestern end of Felice Strait, is a small island, 150 feet high, with a bold, rocky shore.

From Point Percy northeastward to Harris Island, the shore is free from dangers except close-in. Cow Island is a small, wooded island, 100 feet high, northward of the Percy Island group. Northward of Cow Island are two wooded islets, 180 feet high, between which and Cow Island are two reefs which bare.

Harris Island is a small wooded island, 90 feet high, lying northwest of Hotspur Island. Along the north shore of this island there are considerable quantities of kelp which should be given a berth of at least 150 yards in rounding the island. Good anchorage in 6 to 12 fathoms, sandy bottom, can be had in the bight ¼ mile northeastward of Harris Island.

Point Davison and the southwestern part of Annette Island are low and wooded. There are numerous off-lying islands and reefs for some distance from the main shore. The extremity of Point Davison is a double island with a small wooded patch on it, and is conspicuous only from eastward or westward.

Tamgas Harbor (chart 8074), the entrance to which lies 1½ miles northward of Harris Island, is a landlocked anchorage suitable for small and moderate sized craft. The depths are generally good except near the southwestern shore, which is shoal. **Grass Rock**, ⅜ mile from the western side of the entrance, is 15 feet high and grass covered. A rock, bare at low water and marked by kelp, lies about 200 yards 160° true (SE ½ E mag.) from Grass Rock. **Mule Rock**, ¼ mile from the eastern shore at the entrance, covers at high water; it may be passed on either side. A shoal extends nearly ½ mile east-southeastward from Deer Point on the west side, 1 mile above Grass Rock. Shoals extend 300 yards offshore between **Tent** and **Crab Points**, and 200 yards off Yellow Point, thus narrowing the channel to a width of about 250 yards between these points. The best anchorage is in 6 fathoms in the middle about ½ mile northward of

Crab Point, taking care to avoid the 15-foot spot shown on the chart.

In entering Tamgas Harbor, pass eastward of Grass Rock, avoiding Mule Rock, and keep the eastern shore aboard, distant not over 300 yards until up to Tent Point. Then follow a mid-channel track into the harbor.

Survey Point, east of the entrance to Tamgas Harbor, is indefinite; both it and the southeastern portion of Annette Island are low and wooded for a distance of 1½ miles and then it rises rapidly to the summit of Davison Mountain.

Ajax Reef, 2½ miles 91° true (NE by E ½ E mag.) from Harris Island and about ½ mile offshore, extends ¼ mile in a northeast direction, and entirely covers at ¾ flood. It is surrounded by kelp and is marked by a buoy on its northwest side.

Wallace Reef, 2 miles northeastward from Ajax Reef and about ½ mile off the Annette Island shore, has a least depth over it of 3 feet, is surrounded by kelp, and is marked on its northerly side by a buoy.

Snipe Island is small, 10 feet above high water, and has a few grassy patches on the highest part.

Annette Point is low and wooded and has deep water close to.

Indian Rock, 2 miles north-northeastward of Annette Point and ¾ mile off Annette Island, is a cluster of rocks, about ¼ mile in diameter, several of which bare at extreme low water and are marked by heavy kelp.

Bostwick Reef lies 1 mile northeastward of Indian Rock; it is of considerable extent, marked by kelp, and has a least found depth of 9 feet.

Ryus Bay is on the northwest side of Duke Island, 1 mile northeastward of Vegas Islands. It is easy of access, well sheltered, and affords excellent anchorage for small craft in 10 fathoms, muddy bottom.

Tamgas Reef, about ¾ mile off the Duke Island shore, covers an area ¼ mile long by 200 yards wide, and the highest parts of it is awash at high water.

Dog Island is heavily wooded and has a rocky shore. Double Islands are small, low, and wooded.

Fish Islands, two in number and surrounded by moderate-sized rocky ledges, are about 150 feet high and heavily wooded.

Pond Bay, lying eastward of Dog Island, between it and Duke Island, is 2½ miles long, ½ mile wide, and affords good anchorage when once inside, but is little used on account of the dangerous approach. The entrance from Felice Strait southward of Dog Island bares about 2 feet at low tide. There is a deep passage (6 fathoms) leading northward of Dog Island into Pond Bay, but it is obstructed by rocks and requires local knowledge to enter safely. The best approach to Pond Bay is from Revillagigedo Channel, between Grave Point and three islets off the southeast point of Cat Island. The best water leads about ⅓ mile off Grave Point until up to a reef extending south-southwestward from a small high-water island off the northeast point at the entrance to the bay; thence it leads about in mid-channel. It is advisable for a stranger to enter at low water and with caution.

Danger Passage, between Cat and Mary Islands, has a least width of 350 yards between the 3-fathom curves, and is suitable only for small craft. Chart 8075 is the guide.

Mary Island is 4 miles long, 2¼ miles wide, low, and densely wooded near the shores.

Custom House Cove (chart 8068) is an indentation in the west side of Mary Island, which affords good shelter during southeast weather. The anchorage is in the middle, 300 yards from the bare ledges fringing the shore, and with the old customhouse bearing 142° true (ESE mag.), in 12 to 15 fathoms, hard bottom.

Giant Point, the northwestern extremity of Mary Island, has reefs extending 200 yards northward from it.

Khwain Bay and **Crab Bay** are on the east shore of Annette Island, opposite Mary Island. The former affords fair anchorage for moderate-sized vessels and has an apparently clear entrance southward of the rocks in the center of the bay. Crab Bay is an excellent anchorage for small craft and is considerably used.

Currents in Felice Strait have considerable strength. At Harris Island they have a maximum velocity of about 4 knots, diminishing rapidly at short distances away. Around Snipe Island the currents have a maximum velocity of 4 knots.

DIRECTIONS, FELICE STRAIT.

Pass ½ mile westward (mag.) of Percy and Cow Islands, and ¼ mile westward of Harris Island to a position ¼ mile northwestward of it. Then steer 93° true (NE by E ⅝ E mag.), with Snipe Island ahead, until Survey Point is abeam. Then steer 89° true (NE by E ¼ E mag.), with the lower part of Fish Island ahead, and the islets 1 mile westward of Harris Island astern, until Snipe Island is on the quarter and the shore northward along Annette Island opens up. This course has been examined by means of a wire drag to a depth of 22 feet and is clear of dangers. When Snipe Island is on the quarter, follow the east shore of Annette Island, about ¼ mile off, until past Indian Rock. Thence the chart is the guide.

NICHOLS PASSAGE

(chart 8075) lies between Annette Island on the east and Gravina Island on the west, and connects Clarence Strait with the eastern end of Tongass Narrows. It offers the shortest route for vessels from Dixon Entrance and the southern part of Clarence Strait to Ketchikan. There are several clusters of dangerous rocks in the passage, but they are easily avoided in daylight and clear weather. The channel eastward of Warburton Island is the one generally used, and it is marked by lights and buoys.

The southern end of Annette Island (eastern side of Nichols Passage), from Point Davison to Yellow Hill, is about 200 feet high and wooded. The shore line is irregular and broken by numerous small bights, islands, and rocks. **Yellow Hill** is a marked yellow-topped hill, 525 feet high, 1½ miles southeast by south (mag.) from Metlakatla. The summit is formed of several bare, rounded knolls of approximately equal elevation.

Hid Reef lies nearly 2 miles off the Annette Island shore at the southern entrance to Nichols Passage. On the reef are three distinct clumps of rocks, bare at about half tide, with narrow passages between them. The outermost rock lies 2¾ miles south-southwest (mag.) from Cedar Point, and is marked by a buoy.

Dall Head, the southern end of Gravina Island, is the western headland at the southern entrance to Nichols Passage. It is low and wooded, the elevation of the lower part being about 200 feet to the top of the trees. At a distance of 1½ miles northwest of Dall Head the land rises rapidly to the high mountains of **Dall Ridge,** which, with its high and remarkable peaks of nearly 3,000 feet elevation, forms, in clear weather, a conspicuous landmark from Clarence Strait and Dixon Entrance. The southern end of Dall Ridge is unusually rugged and broken. The southernmost summit, elevation 1,780 feet, is crowned with a narrow cap of trees, below which for 600 feet are bare cliffs of gray and brownish rock. There are several rounded hills, of about 500 to 600 feet elevation, which are covered with dead trees and show white against the mountains of Dall Ridge. At the south end of Dall Ridge are two large landslides facing south.

Bronaugh Islands, extending from ½ to 2 miles southeastward from Dall Head, are low and wooded, with rocks and reefs surrounding them. The easternmost island of the group, known as **Point McCarty,** is bare on the southern and eastern edges, and is marked by a light.

A rock, bare at half tide, lies ⅝ mile 235° true (SSW ¼ W mag.) from Point McCarty. Several other similar rocks lie between this one and the Bronaugh Islands.

A rock, bare at low tide, and with deep water close to it, lies ¼ mile 105° true (ENE ¾ E mag.) from Point McCarty.

Banks and broken ground, with least found depths of 7 to 15 fathoms, lie ⅜ to ⅝ mile northward and north-northeastward from Point McCarty; this area should be avoided.

There is a narrow **passage between the Bronaugh Islands and Gravina Island,** having a least found depth of 35 feet, which is considerably used by small craft with local knowledge. In using it pass 100 yards westward of the northern island, southeast of Dall Bay, 100 yards westward of the group of islets ¼ to ½ mile south of that island and 100 yards off the Gravina Island shore. Then head about 100 yards off the western shore of the nearest wooded islet (about southeast by south, magnetic) until abreast its western part and ¼ mile east-southeastward of Dall Head. Then steer about 243° true (SW by S mag.) for ½ mile, with the western part of the islet astern, passing between a reef on the starboard hand and a sunken rock on the port.

To enter Nichols Passage between Bronaugh Islands and Dall Head when coming from points across Clarence Strait, set a course to pass about ¾ mile southeastward of Dall Head; at night the light on Point McCarty should be kept barely open northward of the southeasternmost large Bronaugh Island. When nearly on line between the south end of this island and Dall Head steer 7° true (NNW mag.) for 1½ miles, passing close eastward of the Gravina Island shore and 100 yards westward of the islets which lie 1 mile southeast of the nearest point at the entrance to Dall Bay. Then pass about 100 yards westward of the islet on the west side of the large island off Dall Bay and 100 to 350 yards westward of the northwest end of the island itself; from this point the chart is a sufficient guide.

Warburton Island lies 2¾ miles northeastward of Point McCarty and 1¼ miles from the shore of Annette Island. It is about ¼ mile in diameter, 130 feet high, round topped, and has steep, rocky shores. It is marked by a light on the eastern side.

A rock, with 9 feet over it, lies nearly 200 yards west of the island.

Kelp Rocks are four patches, with deep water around them, as follows: Two rocks which show 3 feet at low water lie 1 mile and 1¼ miles, respectively, 314° true (WNW ¾ W mag.) from Warburton Island; a rock with 4 feet over it lies 1¼ miles 345° true (NW mag.) from Warburton Island; a rock with 10 feet over it at the north end of the group lies 1½ miles 3° true (NNW ⅜ W mag.) from Warburton Island, and is marked by a buoy on its northeast side. Warburton Island, open from the southwest end of Annette Island, leads eastward of Kelp Rocks. The northerly rock is on the range of the waterfall in Port Chester and the north end of Gull Island.

Port Chester (chart 8074).—Port Chester is an extensive bay indenting the western shore of Annette Island, northeast of Warburton Island. **Village Point**, on the southeast side of the entrance, is low and sandy, with a gravel beach on the eastern side. Southwestward of Village Point are extensive reefs which bare to a distance of ¼ mile offshore.

Metlakatla is a native mission and post office on the east side of Village Point, south side of Port Chester. There is a wharf on the north side of the village, and ¼ mile eastward a sawmill without wharf. A large white church with two square towers is conspicuous from Nichols Passage. There is a store, and provisions in limited quantities can be obtained. There is also a blacksmith shop.

Port Chester is encumbered by numerous islands and reefs, of which the southernmost is Gull Island, 150 feet high and wooded. Lying ⅜ mile southwest of Gull Island is a rock, awash at highest tides, surrounding which, and extending to the islet, are extensive ledges with bare heads; the southwestern extremity of these ledges is marked by a buoy. Another ledge with bare heads extends ¾ mile eastward from Gull Island.

Scrub Islands have two scraggy clumps of trees and are surrounded by ledges, mostly covered at high water.

Hub Rock is a small bare ledge, about 6 feet above high water.

Martin Rock, awash at low water, lies 325 yards west-northwestward from Hub Rock; it is not marked by kelp.

Murdo Island, locally known as Battleship Island from its one mast-like dead tree and several turret-like stubs, is grass-covered, with several small trees growing among the stubs. Extensive ledges extend ⅜ mile westward and southward from the island.

Fillmore Rock lies ⅓ mile northwest of Murdo Island, and bares 1 foot at lowest tides.

Lively Rock lies ½ mile northwest of Murdo Island, and has 5 feet over it at low water.

Hemlock Island, lying close to the north shore of Port Chester, is 225 feet high and wooded. It is fringed with reefs, and at lowest tides is connected at its northerly corner with Annette Island.

There are three channels leading to Port Chester, of which the southern one, between Gull Island and Village Point, is of chief importance; it has been examined by means of a wire drag and the dangers are shown on the chart. Enter on an 85° true (NE by E

mag.) course with Warburton Island light directly astern. The second entrance is the narrow passage between Murdo and Gull Islands, and it is seldom used. The northern entrance leads from a point ¼ mile or more off Driest Point toward the south edge of Hemlock Island until within about ¼ mile from the island, when the greater part of the village of Metlakatla will be seen eastward of Murdo Island and Yellow Hill will be in line with the church. Then head between the wharf and the sawmill, passing midway between Scrub Islands and the northeastern extremity of the ledge off Gull Island.

Port Chester does not afford good anchorage. During southeasterly gales winds blow with great violence across it, and williwaws of almost hurricane force sweep down from Purple Mountain and across the anchorage. Probably the best anchorage is to be had at the intersection of the following ranges: Tangent to Driest Point showing between the Scrub Islands, and the outermost house on Village Point just open from the wharf. The depth here is 14 fathoms, muddy bottom.

Driest Point, on the northeast side of Port Chester and separating it from Sylburn Harbor, is a narrow rocky stretch of land, 250 feet high, and wooded down to high-water line. Foul ground extends ½ mile north-northwestward from the point.

Sylburn Harbor is a small bay north of Driest Point, the south end of which affords fair anchorage for small craft in 7 to 18 fathoms. Nearly in the middle of the outer entrance to Sylburn Harbor is a large double rock which is covered several feet at high water. Strangers entering the harbor are advised to wait for low water when the dangers are visible. A 159° true (SE ½ E mag.) course, with the middle of Blank Inlet astern, and the middle of the south bight ahead, leads midway between the foul ground off Driest Point and the rock in the middle of the outer entrance.

Dall Bay, on the western side of Nichols Passage, 1 mile northward of Dall Head, is mostly filled with small islands and ledges, but it affords good anchorage for small craft between the south ends of the two islands well inside of the bay. Rocks awash at low water lie ⅜ mile 295° true (W ⅜ S mag.) and ⅝ mile 345° true (NW mag.), from the large island off Dall Bay, and a ledge extends some 200 yards northward from the southern entrance to the inner bay.

Enter Dall Bay cautiously on about a 277° true (WSW mag.) course, taking care to avoid a rock awash which lies 250 yards north of the island, just inside the south point at the entrance to the inner bay.

Seal Cove (chart 8084) is on the west side of Nichols Passage, 4 miles northwestward of Point McCarty. It has depths of 5 to 6 fathoms, but on account of its narrow entrance it is suitable for small craft only. A reef, mostly bare at half tide, extends across the entrance, through which are two channels. The northern one has a depth of 8 feet and width of 75 yards, but it is full of bowlders and dangerous. The southern entrance is generally used. It is close to the southern shore, between it and a ledge, bare at low water, about 50 yards off, and has a depth of 9 feet. There is thick kelp and strong currents in the channel. A rock, with 6 feet over it, surrounded by kelp and marked by a buoy, lies ⅜ mile 97° true (ENE mag.) from the highest part of the reef in the entrance to Seal Cove.

Bostwick Inlet, on the west side of Nichols Passage, 6 miles northwestward of Point McCarty, extends 2¼ miles west-northwestward. It affords no shelter in southeast weather. The southerly shore is generally foul and the upper part of the bay bares for ¾ mile from the head. In entering, follow the north shore at a distance of about ¼ mile.

Blank Inlet extends 3 miles west-northwestward into the shore of Gravina Island at a point about 3 miles from the eastern end of Tongass Narrows. It is open to all sea from Nichols Passage and affords no sheltered anchorage. A rock, bare 7 feet at low water, lies almost in the center of the inlet.

Blank Islands, two in number, 200 feet high and wooded, are near the north side of the entrance to Blank Inlet. The southerly shore line is bare rock for 50 to 100 yards outside the trees, and the shore is bold. A light is maintained on the southeasternmost point of the islands. Small craft can find good anchorage in the bight on the north side of the islands.

Walden Rocks are a group of bare rocks at the north entrance to Nichols Passage. The group is about 300 yards long by 125 yards wide, and at its eastern end shows about 10 feet at high water, at which time the smaller rocks are covered. West of the group about 150 yards is a rock that covers at half tide and shows kelp. Close northward of the group are other kelp-marked rocks, and ¼ mile northwestward is one with 6 feet over it. Southeastward of Walden Rock, ⅝ mile, is a large double rock which covers at three-quarters flood; between it and Annette Island are a number of rocks which bare.

On Walden Point there is a native fishing camp with considerable shelter for small craft directly off it.

Currents.—Vessels bound to Nichols Passage from points across Clarence Strait should take the currents into consideration, for the course is rarely made good. In Nichols Passage the flood sets northward with a velocity of 1 to 3 knots, the greatest strength being felt in the vicinity of Walden Rocks. Currents are considerably influenced by the winds.

COURSES AND DISTANCES VIA NICHOLS PASSAGE FROM CAPE CHACON TO KETCHIKAN.

	Course.		Distance in nautical miles.
	True.	Magnetic.	
	°		
From 1 mile eastward of Cape Chacon to 2 miles westward of Hid Reef, Point McCarty light ahead.	21	N ¾ W.....	25½
A considerable set of the current is noticeable on this course and due allowance should be made for it.			
To ¼ mile eastward of Warburton Island light.....	49	N by E ¾ E..	4½
To ¼ mile eastward of Kelp Rocks buoy.....	5	NNW ¼ W...	1½
To ¼ mile eastward of Blank Island light.....	357	NW by N....	6½
To eastern end of Tongass Narrows, Potter Rock gas buoy ahead.	41	N by E.....	2¾
To Idaho Rock float light.....	323	WNW.....	1¼
To Ketchikan.....	313	WNW ⅞ W..	2¼

KASAAN BAY

has its entrance on the western side of Clarence Strait, between Island Point and Grindall Island, where it is 4 miles wide, and extends about 17½ miles westward. About halfway up the bay, in the middle, are several islands, with a clear channel on the north side ¾ mile wide. The north side of Kasaan Bay to near its head is a high, steep mountain ridge, heavily timbered. On the south side the land is lower, and there are several inlets. High Island and Patterson Island lie on the south side at the entrance to Kasaan Bay.

High Island is wooded, rounded, and about 500 feet high. A wooded islet about 80 feet high lies close to the east side of High Island.

Patterson Island, lying close westward of High Island, is about 250 feet high, nearly level, and wooded. A rock, awash at lowest tides and marked by kelp, lies ⅝ mile east by north (mag.) from the south point of Patterson Island, and rocks, bare at various stages of the tide, lie between the rock and the point. There is a deep passage about ¾ mile wide on the south side of Patterson Island between it and the main shore.

Grindall Island, on the north side, at the entrance to Kasaan Bay, is about 1½ miles long east and west. It is heavily wooded and has two knobby hills, the western one about 400 feet high, the other about 250 feet.

Grindall Passage is frequently used by those with local knowledge in entering Kasaan Bay from northward, but caution is required. A rock, with a least found depth of 22 feet over it, lies about in mid-channel. A rock, covered at highest tides, lies off the southeast part of Grindall Point at the southwest end of the passage. It is surrounded by reefs showing kelp. A wooded islet and two bare rocks south of it lie close to the west end of Grindall Island. Southwest of the southern bare rock is a partly bare and sunken reef nearly ⅜ mile long, showing kelp. A contracted fair-weather anchorage for small craft can be had near the head of the bight on the northwest side of Grindall Passage in 16 fathoms, rocky bottom. It is not well protected except from northwest.

Skowl Arm.—This arm is about 12 miles long, and the head of it is only about 2 miles from the head of Cholmondeley Sound, though the intervening land is high. The eastern point at the entrance to this arm is known as Skowl Point; it is really a group of small islands lying close inshore 2 miles west of Patterson Island. There are some outlying bare rocks about ¼ mile west by north (mag.) off this point, with a 20-fathom passage inside them. On its north side 3½ miles up the arm is an abandoned Haida village commonly known as **Old Kasaan**. In front of the village a ledge covered one hour before high water extends about 100 yards from shore. A contracted fair-weather anchorage can be made in 15 fathoms about 250 yards from shore off the southwest end of the village, with the south end of the large island east of the village in line with Skowl Point. Beyond the village the western arm is known as **Polk Inlet** and is not navigable for vessels of any size owing to its narrowness and many dangers. Small vessels, entering with caution, might find an anchorage at its head. The tidal currents have an estimated maximum velocity of 2 to 3 knots in the contracted parts of the arm.

McKenzie Inlet (chart 8077), the south branch of Skowl Arm, extends 5 miles in a southeast by south (mag.) direction. McKenzie Rock, which always shows, lies ½ mile southwestward from the eastern point at the entrance and there is no safe channel between. A rock awash at low water lies 300 yards from the eastern side ½ mile southeastward of McKenzie Rock. About 1 mile inside its entrance the channel leads between two round, wooded islands. Kelp extends from the islands a short distance into the channel, which is narrow and in which the mid-channel depth is 11 fathoms. A careful mid-channel course between the islands leads through safely; above the islands the inlet is clear. **Kiam** is an abandoned mining camp on the southwest side at the head of the inlet. There is good anchorage ½ to ⅝ mile northwestward of the camp in 12 fathoms, also for a small vessel about 300 yards northwestward of the camp in 7 to 9 fathoms. The flat at the head comes down nearly to the camp.

Saltery Cove is a small bay, about 1 mile long, in the southeastern shore of Skowl Arm, 2½ miles inside Skowl Point and just northeastward of McKenzie Inlet. There is a cannery near the head of the cove. Small craft can find good anchorage in 7 to 9 fathoms, soft bottom, between the cannery and a small rocky islet east-northeastward, taking care to avoid a rock with 4 feet over it about 100 yards off the cannery wharf. A group of islands lie in the entrance to Saltery Cove; pass westward and southward of them in entering, and follow the southern shore of the cove at a distance of 200 yards.

A reef, covered at three-quarters flood, lies 1¼ miles north-northwestward from the northwest point at the entrance to Skowl Arm, and ½ mile off the south shore of Kasaan Bay.

A reef, showing at low water, lies ¼ mile from the north shore of Kasaan Bay off a ragged cliff on the mountain side 1 mile eastward from Mount Andrew.

Mount Andrew is a mine wharf and ore bunker on the north side of Kasaan Bay, 7 miles west of Grindall Island. The wharf has a depth of about 30 feet along its face. A rock, with 4 feet over it, lies a little over 100 feet east-southeastward of the wharf and extends out to the line of its face.

Kasaan is a native village, cannery, and wharf on the north shore of of Kasaan Bay, 11 miles westward of Grindall Island. It has a post office and store where fishermen's supplies can be obtained. Fresh water can be had at the cannery wharf.

Long Island, about 2 miles in length, low and wooded, and Round Island, a small wooded islet west-northwest of Long Island, are the most noticeable of the islands in the middle of Kasaan Bay. The passage south of Long Island has not been examined, but is supposed to contain considerable foul ground; the passage north of the island should always be used. Small craft can find good anchorage on the north side of the eastern end of Long Island, but the entrance is narrow.

Coal Bay is on the south shore of Kasaan Bay 3½ miles southwest of Round Island. It is a fairly good anchorage in 8 to 14 fathoms, but it is probable that winter gales from northwest blow hard into the bay and send in some sea. There are some coal croppings at the head of the bay. From the west point at the entrance to Coal Bay

a reef, covered at about three-quarters flood, extends about ⅜ mile northward.

Kina Cove, on the west side of the point and reef separating it from Coal Bay, is 1½ miles long and nearly ½ mile wide. It is a good anchorage in 8 to 12 fathoms.

Twelvemile Arm, an inlet extending southward from near the head of Kasaan Bay, is about 12 miles in length and narrow. The depths are generally good, but it has not been closely examined, and uncharted rocks undoubtedly exist.

Hollis Anchorage (chart 8077) is on the west side of Twelvemile Arm, nearly 5 miles inside the eastern point at its entrance. It is about 1 mile long north and south and ⅜ mile wide, with depths of 5 to 7 fathoms in the middle, but it is shoal for a distance of 600 yards from its north and south ends. **Hollis** is a post office on the west side of the anchorage. Landing is made on the beach. There is good anchorage off Hollis in 6 to 7 fathoms. The entrance is 450 yards wide, and is obstructed near the middle by a ledge, bare at half tide. The least water found in the channel south of the ledge is 14 feet and north of the ledge 30 feet, and care is required in entering. The larger vessels entering usually pass north of the ledge. Hollis Anchorage is sometimes obstructed by ice during the winter.

Sandy Point is the northwest point at the entrance of Twelvemile Arm. A bowlder flat, covered at highest tides, extends about ⅜ mile eastward from the point.

Karta Bay (chart 8084), on the north side of the head of Kasaan Bay, is a secure anchorage, with a clear width of 450 yards.

It Mine is a mine wharf and ore bunkers on the north side of the head of Kasaan Bay, 3½ miles west of Kasaan and 14½ miles west of Grindall Island. There is a depth of 15 to 18 feet at the end of the wharf. It is reached by a channel 100 to 300 yards wide, which leads between a reef and a sand spit. The channel is usually marked by single-pile beacons driven at frequent intervals on each side. Good anchorage in about 4 fathoms can be had about 150 yards off the wharf. Without local knowledge only small craft should attempt to enter; chart 8084 is the guide.

The head of Kasaan Bay is separated from the main part of the bay by a chain of wooded islands and affords secure anchorage in 5 to 8 fathoms. At the northwest end of the anchorage is the wharf and ore bunkers of the Rush and Brown copper mine. The best entrance is between the fourth and fifth islands counting from eastward. This passage is 225 yards wide, but the channel is only 50 yards wide between the 3-fathom curves, with a depth of 4 fathoms in the middle. A shoal with 9 feet over it lies 300 yards southwest of the southeast end of the third island, and reefs bare at low water extend about 300 yards southeastward from all the islands.

To enter, steer 328° true (NW by W ½ W mag.), heading midway between the fourth and fifth islands, and when abreast the upper end of the fifth island steer 345° true (NW mag.), favoring the side of the fourth island. Then follow a mid-channel course westward and anchor about 200 yards off the wharf in 5 to 6 fathoms. Shoals make out about 100 yards, and in places more, from all the shores in the anchorage.

ERNEST SOUND.

Ernest Sound is the large body of water which opens from Clarence Strait between Lemesurier Point and Onslow Point, with a width of about 4 miles between the points. Its general direction is northward for 25 miles to Point Warde; from this point, under the name of Bradfield Canal, it extends 17 miles in a general northeasterly direction, with a width of about 1 mile. There are numerous small islands in the sound, and two large ones, one on each side, about midway of its length.

From Ernest Sound two arms extend northwestward, and joining near the mouth of Stikine River inclose Wrangell Island. The southwest arm is called Zimovia Strait. The southeast part of the northeast arm is called Blake Channel and the northwest part Eastern Passage. A passage to Wrangell through Ernest Sound, Blake Channel, and Eastern Passage is practicable, and is sometimes used. Small craft use Zimovia Strait frequently.

There is a cannery on the northeast side of Union Bay, one at the head of Santa Anna Inlet, and one in a cove on the south side of Point Warde.

The shores of the sound and its tributaries, and also such rocks as could be seen at various stages of the tide, are accurately charted. In addition, the main part of the bay as far north as Eaton Point, a channel ¾ to 1½ miles wide from Eaton Point to the north end of Deer Island, and the channel from Deer Island to the junction of Blake Channel and Bradfield Canal, and through Blake Channel and Eastern Passage, have been examined by means of a wire drag. None of the other tributaries, except Union Bay and a part of Zimovia Strait, have been closely examined.

The principal dangers in the main part of Ernest Sound are McHenry Ledge, with a depth of 3 feet; and an 18-foot rock off the entrance to Union Bay. To keep in the middle of the dragged channel between Eaton Point and the north end of Deer Island, vessels should pass ⅝ mile westward of Eaton Point, 1¼ miles westward of Point Peters, in mid-channel between Deer and Niblack Islands, and ⅝ mile westward of the north end of Deer Island.

Lemesurier Point, the south point at the entrance to Ernest Sound, is long, low, and wooded.

Lemly Rock, ¼ mile off Lemesurier Point, is about 3 feet high. At low water there are three rocks close together, with sunken rocks between them. **McHenry Ledge**, with a depth of 3 feet and showing kelp, lies ¾ mile west-northwestward of Lemly Rock; it is marked by a red buoy 200 yards westward of it. The shores are bold and there is a good passage inside these rocks, but the currents have considerable velocity.

The **Onslow group**, on the north side at the entrance to Ernest Sound, is five wooded islands and numerous small ones, the largest of which is Onslow Island, 3¼ miles long and about 350 feet high.

Anchorage for small craft can be had between Onslow and Eagle Islands, among the Stone Islands, and northward of the Stone Islands on the south shore of Etolin Island.

Onslow Point is a small cluster of islets and rocks forming the southeast extremity of the Onslow group. Several rocks, showing

only at low water, lie off these islets, and also off the southern and western shore of Onslow Island, and these shores should not be approached nearer than ½ mile.

Brownson Island, on the west side of Ernest Sound, 7 miles above Onslow Point, is 7 miles long, 1 to 2 miles wide, about 1,000 feet high, and is separated from Etolin Island by a narrow passage, called **Canoe Passage**, navigable only for boats. Canoe Passage is bare for a considerable distance at low water. A number of small islands are southward of Brownson Island, and one low-water rock was noted northeastward of its southern end, about ⅝ mile offshore and nearly ¼ mile northeastward of one of the smaller islands. Several rocks were seen at low water south of the southern end of Brownson Island, the most distant being 2½ miles from it, but they are all westward of the main channel. A rock, with 5½ feet over it, is reported to lie ¾ mile eastward of the north end of the island, ⅜ mile off its northeastern shore.

Deer Island lies northeast of Brownson Island, on the opposite side of the sound; it is about 7 miles long, 2 miles wide, and about 1,500 feet high. There is a passage between this island and the mainland, called **Seward Passage**; it is apparently unobstructed, and is used by vessels going to the cannery on Santa Anna Inlet, but has not been sounded out.

Niblack Islands are a cluster of small islands between the northwestern ends of Brownson and Deer Islands; there is a clear passage on either side, but that on the northeast side is more direct, and is the one that has been dragged.

Union Bay (chart 8124), on the northeast side of Lemesurier Point, is 3½ miles wide at the entrance, 1¼ miles at its head, and is about 3 miles long; at its head is a large lagoon, mostly bare at low water, into which empties a large stream. There is a cannery and wharf on the northeast side of the bay, about midway between Union Point and the head. The waters of the bay are deep, but there is anchorage with good protection from southward, on the east side of the head of the bay, in about 18 fathoms. The southwest angle of the bay is foul for ¼ mile offshore. The bay has been examined by means of a wire drag. The only danger, except near the shores, is a rock with a depth of 18 feet in the middle of the entrance and 2⅜ miles northward of Lemly Rock. At high water do not approach the head of the bay too rapidly, as the points at the entrance to the lagoon are platforms of rock only 3 feet above high water and are not readily distinguished. Anchor in 18 fathoms, ⅜ mile offshore, on the east side of the head of the bay, with the northeast point at the entrance to the lagoon bearing east-southeast.

Vixen Inlet, 6½ miles north-northeastward of Lemesurier Point, has a small islet (**Sunshine Island**) in the middle of its entrance, and a stream at its head. A reef makes southward from the south side of Vixen Point. A reef with a least found depth of 5 feet, unmarked by kelp, lies in the middle of the entrance, about 1 mile west-southwestward of Sunshine Island; there is deep water between it and the shore southward. A rock on each side near the entrance, and a rock inside of Sunshine Island, are the other known dangers. Anchorage in 12 fathoms can be had in a small bight on the southerly shore 1¼ miles inside Sunshine Island.

Santa Anna Inlet, on the east side of Seward Passage 3 miles northward of the south end of Deer Island, is about 1½ miles long in an east-southeasterly direction. Good anchorage may be found near the cannery in 8 to 10 fathoms. Fresh water can be obtained at the wharf.

Menefee Inlet, on the west side, west of Niblack Islands, is apparently deep and unobstructed; at its mouth are three islets.

Southwest Cove lies north-northwestward of the largest island at the mouth of Menefee Inlet; no description of the cove is available.

Zimovia Strait, having its entrance at Found Island west of the northwest end of Deer Island, connects Ernest Sound with the eastern end of Sumner Strait. Its length from Found Island to the northwest end of Wrangell Island is about 25 miles, and in width it varies from less than ½ mile to 2½ miles. The strait is used by local vessels of 8 to 10 feet draft.

From the southern entrance to Village Islands some sounding has been done, and from Village Islands to the north end the channel has been examined by means of a wire drag. The channel between Found Island and the north point at the entrance is rocky. The channel is apparently clear for 6 miles from the southern entrance, to a large group of islands on the north side. The channel passes southward of these islands, and then leads along the north side to the deserted village, passing northward of two islands 1 mile eastward of the deserted village. The least depth in the channel in this section is about 20 feet, but there are dangers close to the channel on both sides, and great care is required. The channel through the narrowest part of the strait is marked by buoys and beacons. From Village Islands to the north end, the mid-channel is clear, except for Young Rock, at the eastern end of Chichagof Pass, which has a depth of 17 feet over it. In passing Young Rock the shores of Etolin and Woronkofski Islands should be kept best aboard until the rock is passed. Anita Bay is apparently free from dangers and anchorage can be had near its head. There is a low portage, ¼ mile wide, from Anita Bay to the head of Burnett Inlet.

Southeast Cove is an open bight 2½ miles northwestward of the north end of Deer Island.

Fools Inlet, on the west side opposite Point Warde, has good water and is seemingly free from dangers; at its upper end are two small islets, beyond which the water shoals.

There is a cannery at the head of the cove 1 mile southward of Point Warde.. There is a rock awash on the north side just inside the entrance to the cove.

Bradfield Canal is apparently free from dangers. About 12 miles from Point Warde the canal is nearly closed by Duck Island. There is no passage on the southeast side of the island; a large stream draining an extensive valley empties here; the tide "backs" for 1½ miles into this stream. A navigable channel exists on the northwest side of Duck Island, a small islet on the northern shore reducing this channel to ¼ mile in width. Beyond Duck Island the canal continues 2 miles, where it ends in a broad flat off the mouths of two large streams.

Blake Channel, having its entrance 3 miles north-northeastward of Point Warde, connects Ernest Sound with **Eastern Passage**, and

through it with the eastern end of Sumner Strait. Both Blake Channel and Eastern Passage have been examined by means of a wire drag, and the shores have been accurately surveyed.

Ham Island lies at the southern entrance, with a narrow channel on each side, both of which have been dragged to a depth of 28 feet. The western channel is about 400 yards wide, is free from dangers, and is the better channel. The channel eastward of Ham Island passes eastward of a reef of sunken and visible rocks extending northwestward from the western end of Ham Island and terminating in a wooded islet 300 yards long; it is 250 yards wide at its narrowest point. There are also some rocks along the north side of Ham Island, which a mid-channel course will avoid. The tidal currents have considerable velocity in this vicinity, and a mid-channel course should be followed through either channel.

From Ham Island to the northern end of Eastern Passage, the only dangers are a rock with a depth of 9 feet over it, a little north of mid-channel, two miles eastward of The Narrows and ½ mile eastward of an island near the north shore; a reef extending about 75 yards off the northwest side of The Narrows at its narrowest point; and a rocky area, with 3 or 4 feet over it at high water on the south side of the channel, southward of the reef on the north side, and just westward of the narrowest part of The Narrows. Vessels can pass on either side of Channel Island and follow a mid-channel course to the northern end.

Berg Cove, the westerly of two coves making northward about 8 miles northwestward of Ham Island, has depths of 5 to 13 fathoms to near its head, and affords the best anchorage in the passage. Vessels can enter on either side of the island in the mouth, but should give the island a good berth, and avoid a reef extending 200 yards northward of the inner end of the island. The other tributaries of Blake Channel and Eastern Passage shoal up rapidly inside their entrances, and are not good anchorages.

Currents.—The tidal currents in Ernest Sound follow the general direction of the channel. The ebb current has a velocity of 2 to 4 knots, the flood current a little less. At the junction of Bradfield Canal and Blake Channel there is a joining of tidal currents, causing swirls.

In Zimovia Strait the tides meet among Village Islets, the flood current setting toward this point from each end of the strait, and the ebb current from this point setting out in both directions. The velocity of the current is about 1½ knots on the flood and 2 knots on the ebb in the vicinity of Village Islets, and less at other points. At the north end of the strait the ebb sets southward and out through Chichagof Pass with a velocity of nearly 3 knots, and the flood sets northwestward with a velocity of about ¾ knot.

In Blake Channel the flood current sets northwestward with a velocity of about 2 knots, and meets the flood current from Eastern Passage in the vicinity of The Narrows. The ebb current sets in the opposite direction with a velocity of about 3 knots.

In Eastern Passage the flood current sets southeastward with a velocity of about 2 knots. From the vicinity of The Narrows the ebb current sets both ways, northwestward through Eastern Passage and southeastward through Blake Channel, with a velocity of about

3 knots. The first and last of the ebb is backed into Eastern Passage by the current from the Stikine River.

CORDOVA BAY

has its entrance on the northwest side of Dixon Entrance between Cape Muzon and Point Marsh and extends 18 miles in a northwesterly direction from between Dewey Rocks and the southeast end of Long Island. The bay has a clear channel 3 miles wide between Barrier Islands and Long Island and an average width of 3 miles from Ship Islands to Lime Point. From the head of Cordova Bay, at Lime Point, Hetta Inlet extends in a general north-northwest direction for 15 miles to Sulzer.

The best entrance to the bay is between Barrier Islands and Long Island, but Eureka Pass eastward of Barrier Islands is sometimes used by vessels with local knowledge calling at Hunter Bay. From Cordova Bay and Hetta Inlet, Tlevak Strait and Sukkwan Strait extend westward and afford through channels to Bucareli Bay. Small craft ply from Ketchikan to Howkan, Cordova Bay, Hetta Inlet, and points on the west coast of Prince of Wales Island.

Point Marsh is a small group of rocky islets close to the main shore, all of which are comparatively low and wooded. Between 1 and 2 miles back of the point the ground rises evenly to an elevation of 1,000 feet with several irregular knobs showing along the slope. Numerous rocks, covered at high water, lie off the point to a distance of ½ mile. Excellent anchorage for small craft can be had in **Minnie Bay**, a small bight in the main shore back of Point Marsh.

Dewey Rocks are small in extent and consist of one large rock, 12 feet above high water, and several smaller ones which go bare at various stages of the tide. There seem to be no outlying dangers. The rocks are marked by a light shown from a structural steel tower.

Round Islands, lying 2 miles northwestward of Dewey Rocks, consist of four wooded islets about 150 feet high. Kelp patches are found for ¾ mile southeastward of the islands.

Egg Rock, 20 feet high and bare, lies ½ mile northwest of Round Islands, with extensive areas of kelp between.

One mile north-northwest of Egg Rock is a wooded islet 60 feet high, with a rock awash midway between it and Egg Rock.

Boat Rocks, two in number, bare, and the larger about 15 feet high, lie 2½ miles north-northwestward of Round Islands and are the northwesternmost dangers of this group. Eastward of a line from Round Islands to Boat Rocks there are numerous dangers.

Wallace Rock, with 5 feet over it, lies 2⅓ miles north-northeast (mag.) of Boat Rocks. It is marked by kelp but not readily discernible. Vessels going to Hunter Bay usually pass well northward of it.

Barrier Islands are an extensive group of wooded islands, 200 to 250 feet high, lying between 2 and 6 miles northward of Dewey Rocks. There is considerable kelp in the passages between the islands. Eastward of Barrier Islands and between them and the mainland is **Eureka Pass.**

Mexico Point, at the southeastern end of Eureka Pass, 3 miles northwestward of Point Marsh, is an island 170 feet high, bluff and wooded, with several high rocky islets extending ¼ mile off it.

Hessa Inlet, north-northeastward of Mexico Point, is 3½ miles long and comparatively deep. It is frequented by small fishing craft with local knowledge. In the narrow entrance tidal currents attain a maximum velocity of 5 to 6 knots.

Eureka Pass affords a short cut to Hunter Bay and is suitable for moderate sized craft with local knowledge; large vessels and strangers should use the passage westward of Dewey Rocks and Barrier Islands. The depths in Eureka Pass are good, but it is narrow and has several dangers, which, however, are generally marked by kelp in summer. Far Point, on the west side of Eureka Pass and the eastern extremity of Barrier Islands, lies 1½ miles northwest of Mexico Point. **Center Island** is a small round island with a few trees, 1¼ miles northward of Far Point, and ⅜ mile southward of **Leading Point**. It is fairly steep-to on all sides, and can be approached closely. A rock, awash at high tide, lies 350 yards west of Center Island. For about ¾ mile northward from Leading Point there lies the narrowest part of Eureka Pass, known as the Narrows, which has a least width of 125 yards. Good depths are found from shore to shore through the Narrows. About 250 yards northward of the northwest point of the Narrows is a rock with 9 feet over it **Guide Rocks** lie ½ mile north of the northern end of the Narrows. They are gray in appearance and can be seen, except at high water, when coming through the Narrows. Guide Rocks are shown on chart 8100 by a sunken rock symbol.

To go through **Eureka Pass from southward**, pass ¼ mile to ½ mile off Mexico Point and head a little westward of Center Island. Pass Center Island on either side, distant not over 300 yards, and head about 200 yards off Leading Point. Round Leading Point at this distance and follow a mid-channel course through the Narrows. From the north end of the Narrows head for a small islet 1½ miles away, keeping Guide Rocks a little on the starboard bow. When nearly up to Guide Rocks change course as desired.

In approaching **Eureka Pass from northward**, when abreast of Turn Island head for a group of sharp-pointed hills on the east side of the Narrows and hold the course until Guide Rocks are passed and the Narrows are open throughout.

Turn Island lies 3 miles northwestward of the northern end of Eureka Pass, and is the easternmost of a number of small islands. It is bare except for a small stunted growth of trees, which gives it the appearance of a building. It is bold-to on the western and southern sides, but foul ground extends about 400 yards north of it.

Turn Point, marked by a light, is 1 mile northeastward of Turn Island and consists of a number of small, low, grassy rocks. It is at the extremity of a low peninsula which has a long wooded ridge extending eastward from about 1 mile eastward of the point. It is not wooded for about 300 yards back from the point.

Hunter Bay makes in for a distance of 2½ miles eastward of Turn Point. The entrance of the bay is about ¾ mile wide and is obstructed on its northern side by a number of islets, but the channel close around Turn Point is comparatively clear. About 1 mile above

the entrance the bay contracts to a width of 275 yards, with a small grassy islet lying in the middle; the best channel is on the northern side of the islet. Three-eighths of a mile eastward of the islet is an arm making northward about 2 miles. The depths are shallow and the tidal currents are strong in the narrowest part. Only small boats can go to its head. There is a cannery on the north side of the bay nearly 1 mile above the islet.

There is good anchorage in Hunter Bay abreast the cannery in 10 to 15 fathoms. Near the south shore of the bay, opposite the cannery, is an islet surrounded by a flat of considerable extent. About ¼ mile beyond the cannery the bay contracts and is foul.

Entering Hunter Bay, round Turn Point at a distance of 200 to 300 yards and head for the grassy islet. Pass close northward of the islet and follow a mid-channel course to the cannery.

Klinkwan is a native village on the north shore of Hunter Bay at its entrance. In the village is a prominent white church with two spires. Back of the village is a prominent conical mountain, 2,400 feet high, the top of which is bright green in summer.

Klakas Inlet joins Cordova Bay westward of the entrance to Hunter Bay. It has not been examined, and little is known about it. The main approach leads east, north, and northwest of Turn Island.

Bird Rocks consist of one conspicuous rock, about 30 feet high, with a smaller one northwestward; large kelp patches extend eastward from these rocks.

Ship Islands consist of four low wooded islands ½ mile from shore, with numerous outlying rocks and ledges. Northward of the islands, on the main shore, are several prominent peaks. Small craft can pass inside of the Ship Islands.

Kassa Inlet has its entrance a short distance northward of the northwesternmost of the Ship Island group. It is about ½ mile wide at the entrance and seems to extend some distance northward and northeastward. Good anchorages for small craft can be found on either side of the inlet about 2 miles inside the entrance. The inlet should be entered with caution, as numerous rocks are known to exist.

Point Webster, 5 miles northwestward of Ship Islands, is a small projection where the eastern shore of Cordova Bay changes direction. There are a number of outlying rocks and reefs in the vicinity of the point, and this shore should be given a berth of ½ mile.

Long Island forms the western side of Cordova Bay for a distance of 12 miles. The eastern shore of the island is rugged and broken, with a number of outlying islets and rocks within a distance of ½ mile. There are also a number of indentations and probably some anchorages.

Coning Inlet, the largest of these indentations, lies 4½ miles northward of Kaigani Point; it is 1 mile wide at the entrance, about 3 miles long, and the mid-channel is apparently free from dangers, but has not been examined. Anchorage is reported near the head of the inlet in 13 fathoms, soft bottom.

Tlevak Strait has its entrance on the western shore of Cordova Bay between Long and Jackson Islands. It is described on page 102.

Jackson Island, on the western shore near the southern end of Sukkwan Island, is 1 mile long, 525 feet high, and has prominent

cliffs at its southeast end. About 300 yards south-southwestward of these cliffs is a kelp-marked rock which bares at lowest tides. The channel between Jackson and Lacey Islands is clear, so far as known, with the exception of the rocks mentioned under Lacey Island. Jackson Passage, the channel west of Jackson Island, is also clear, but there is a rock with 6 feet over it about 200 yards southward of the western point at the southern entrance.

Lacey Island is three small wooded knolls close together joined by bare spits, and lies ¾ mile northeastward of the southeast end of Jackson Island and 3 miles south-southeastward of Mellen Rock. Foul ground extends 200 yards northwest and southeast from the island. A rock, bare at low water, lies 400 yards northeast of it, and ⅜ mile south-southwest of the island are three rocks covered at high water.

Mellen Rock, about 12 feet high, lies ¾ mile from the western shore, and is marked by a light on a structural steel tower.

Hassiah Inlet, on the eastern shore 1½ to 2¾ miles northward of Point Webster, is about 2 miles long to the head of its north and southeast arms, the latter being a landlocked anchorage. **Mabel Island**, ⅝ mile long, lies on the south side in the entrance; and **Helen Island**, ¼ mile in diameter, lies in the southeast arm. To enter the southeast arm, pass northward and eastward of Mabel Island, giving it a berth of ¼ mile, and steer for the eastern end of Helen Island. Follow a careful mid-channel course, passing northeastward of Helen Island, and anchor about ¼ mile from the islet at the head in 10 to 12 fathoms.

Nutkwa Inlet has not been examined. **Keete Inlet** is on its eastern side.

Lime Point is the dividing point between Cordova Bay and Hetta and Nutkwa Inlets. It shows white from bird lime and is prominent from southward. Three bare rocks lie ¼ mile southeastward of the point with other rocks, sunken and awash, between.

Hetta Inlet extends 5 miles northwest by north from Lime Point to the entrance of Sukkwan Strait, and has a width of about 2 miles. Then it trends in a general north-northwesterly direction for 11 miles to Gould Island, above which it is navigable for small craft only. Above Sukkwan Strait the width of the inlet decreases gradually from 1¼ miles to ½ mile and less in places, and there are apparently no outlying dangers.

The bight southeastward of Hetta Point affords temporary anchorage, and the cove eastward of the point affords good anchorage for small craft.

Copper Harbor, on the eastern shore 10 miles above Lime Point, is 1 mile long and ¼ mile wide. A mid-channel course is clear to the head of the harbor, where there is anchorage in 20 fathoms.

Deer Bay, on the western shore 2 miles above Copper Harbor, is ¾ mile long and 600 yards wide at its widest part inside the entrance. It affords good anchorage near the middle in 12 to 16 fathoms and a mid-channel course is clear. A flat extends nearly ¼ mile from its head.

Jumbo Island, in the middle of the inlet 2½ miles above Copper Harbor, is about ⅜ mile in diameter and wooded. The channels on either side are about 300 yards wide, but the better channel is eastward of it.

The wharf and ore bunkers of the **Jumbo Mine** of the Alaska Industrial Co. are on the eastern shore 300 yards above the north end of Jumbo Island.

DELL ISLAND, 1¼ miles above Jumbo Island and close to the eastern shore, is 100 yards in diameter and wooded.

SULZER is a post office, with a store and wharf for vessels, on the northwestern shore 1½ miles above Dell Island. Anchorage can be made about 250 yards southward of the wharf in 14 to 16 fathoms.

GOULD ISLAND practically closes the inlet for a distance of 1½ miles above Sulzer. **Gould Passage**, south of the island, runs dry at about half tide. **Sulzer Passage**, north of the island, is navigable for small craft, but foul for 1 mile above Sulzer, and the tidal currents have considerable velocity.

PORTAGE BAY, that part of the inlet above Gould Island, is 1½ miles long, with depths of 9 to 27 fathoms. From its head there is a planked road to the head of Cholmondeley Sound, about 3½ miles.

SUKKWAN STRAIT AND NARROWS,

shown in parts on charts 8151 and 8153, is a passage used by small craft from Hetta Inlet to Tlevak Strait, northward of Sukkwan Island. From Hetta Inlet the strait extends 7 miles westward to Sukkwan Narrows with good depths and few dangers. Thence it is divided into two parts, known as South Pass and North Pass. **South Pass** extends 4 miles southward to Tlevak Strait, and has good depths in a tortuous channel between numerous rocky shoals and dangers. **North Pass**, on the northwest side of **Goat Island**, has not been surveyed, but it is known that it goes bare at lowest tides and has strong currents at other times.

Sukkwan Narrows has a least depth of 19 feet in a narrow channel, with rocky shoals on both sides. The maximum current is about 2 knots, and sets northward with the flood and southward with the ebb.

Hydaberg is a native village, wharf, and sawmill, ½ mile northward of Sukkwan Narrows. The approach is rocky. Keep the narrows well open astern in going to the wharf.

Good anchorage in the eastern part of Sukkwan Strait can be had in 10 to 15 fathoms, mud bottom, ½ mile northwest of Saltery Point. Small craft can find good anchorage in South Pass in the small bay on the southeast side, 2¼ miles southward of Sukkwan Narrows.

In going through South Pass to Tlevak Strait follow a mid-channel course through Sukkwan Narrows and pass within 80 yards eastward of the island ¾ mile south-southwestward (mag.) of the narrows; this island is low and wooded and the east side is steep-to. When well past this island head about 192° true (S by E ⅝ E mag.) for a mid-channel position eastward of the large island (240 feet high) ahead. Keep in mid-channel in rounding this island and in passing northward of Lone Spruce Rock to Tlevak Strait.

KAIGANI STRAIT AND HOWKAN NARROWS.

Kaigani Strait is the narrow passage extending from Dixon Entrance to Tlevak Strait and separating Long Island from Dall Island. Howkan Narrows is the narrowest part of the passage, with kelp-marked reefs, from American Bay to above Channel Island. The

strait has been only roughly examined, and is little used except by small craft. Strangers from Dixon Entrance bound through Tlevak Strait should preferably use the broad channel through Cordova Bay eastward of Long Island, and enter Tlevak Strait between Long and Jackson Islands.

Except in Howkan Narrows the navigation of Kaigani Strait is not difficult. At its northwest end there is a broad clear channel leading northwestward through Tlevak Strait, also another leading northeastward along the northwest side of Long Island to Cordova Bay.

Kaigani Harbors are three indentations in the shore of Dall Island; they are all exposed southeastward and are of little importance to vessels. The southeastern one, known as **Harris Harbor**, lies 260° true (SW ½ W mag.) from Kaigani Point and affords good anchorage in 20 fathoms, soft bottom. The middle Kaigani Harbor, lying west-southwest of Kaigani Point is about ½ mile long, expanding somewhat from a narrow entrance of ¼ mile in width; in a small cove on the south side a small vessel can find anchorage in about 5 fathoms.

American Bay lies on the southwest side of Kaigani Strait 7 miles above Kaigani Point and about 1 mile southward of Howkan. This bay indents the Dall Island shore nearly 1½ miles in a southwesterly direction, with a width of about ½ mile. On the northwest side, ¼ mile within the entrance, is a group of four wooded islets called Bay Islets, connected with each other and with the shore at low water. Good anchorage can be had in the bay a little northward of mid-channel and about 400 yards 238° true (SSW ½ W mag.) from Bay Islets, in 12 to 15 fathoms, muddy bottom. The water in the bay is deep, particularly on the southern side, and there are no known dangers; the head of the bay should not be approached closer than ¼ mile.

A reef, covered at high water, lies opposite the entrance to American Bay, 200 yards from the shore of Long Island.

Howkan is a native village and store on the northeast side of Howkan Narrows about 8 miles above Kaigani Point.

Mission Cove is a small bight north of the point at Howkan. Small craft can anchor in the cove in 6 to 9 fathoms; there is considerable kelp in the cove, and a rock awash at lowest tides lies at the head.

Howkan Reef, bare at half tide and surrounded by kelp, extends 300 yards southwestward from the shore at Howkan; at the eastern end of the reef is a small island with Indian graves. There is deep water close to the reef.

An extensive kelp patch, about 600 yards in diameter, lies on the southwest side of the channel, its eastern edge about 300 yards southwest of the end of Howkan Reef. The least depth found in the kelp was 14 feet, but there may be less. The channel is 300 yards wide between this kelp patch and Howkan Reef. There is no safe channel between this kelp patch and the southwest shore. **Mill Reef** shows at high water and lies between this kelp patch and the shore westward of it.

Channel Island, ½ mile west-northwest of Howkan, is two wooded islands joined by a bare spit, the whole ⅜ mile long east and west. A shoal with kelp extends about 250 yards southeastward from the east end of Channel Island, and there is kelp a short distance off its western end. The main channel is southwestward of the island. The

channel northeastward of Channel Island is used by small craft going to and from Howkan, but is narrow in places between kelp patches.

Sawmill Cove, on the southwest side, 5/8 mile westward of Channel Island, has a very narrow entrance and can be entered by small craft only.

Pond Rock, awash at low water and marked by kelp, lies 3/8 mile west-northwest of the end of Channel Island and 1/2 mile northeastward of the entrance to Sawmill Cove. There is another rock, awash at low water and marked by kelp, reported to lie about 3/8 mile northeastward of West Mill Rock and nearly 1 mile west-northwest of the west end of Channel Island. West Mill Rock is the eastern one of two islets close to the shore 1 mile westward of Channel Island.

One-half mile northwestward of West Mill Rock is a grassy islet from which a reef makes off about 1/4 mile.

A large kelp patch on a reef bare at low water lies 1/2 mile north-northwestward of Channel Island.

Kelp extends about 200 yards off the southwest side of the island close to the northwest end of Long Island.

Grace Harbor, on the southwest side of Tlevak Strait, 3 miles westward of Channel Island, is about 1 mile long in a southwesterly direction. When entering give the northwest point at the entrance a berth of over 1/4 mile to avoid the rocks extending southeastward from that point, and then stand in for the inner bay or basin in mid-channel. Anchor near the middle of the basin in 10 to 15 fathoms, soft bottom, taking care to avoid a ledge which extends 150 yards from the northerly shore. A flat makes out 150 to 200 yards from the mouth of the creek. Southwest winds seem to draw through a low divide from the ocean.

Vesta Bay, on the southwest side of Tlevak Strait, 4 1/2 miles westward of Channel Island, is about 1 mile long in a southwesterly direction, and appears to be clear in mid-channel. The anchorage near the head of the bay is in 15 to 20 fathoms, soft bottom, with scant swinging room. **Bushy Island,** small and wooded, lies close to the southwest shore between Vesta Bay and Rose Inlet.

Rose Inlet is on the southwest side of Tlevak Strait midway of the length of Dall Island. It is about 2 miles long, 1/2 mile wide, and has several small islands in the entrance. There is a cannery and wharf near the head. Rose Inlet can be recognized by three patches of bare cliffs on the northwest side of the entrance and by a light on the outermost island. The best channel leads westward of the outer island in the middle of the entrance, then between the islands southward of the outer island and the group which extends 600 yards from the western shore, favoring the group. Beyond this the inlet is clear, except near the shores, until approaching the cannery. A rock, bare at lowest tides and marked by a buoy, lies 240 yards 153° true (SE by E mag.) from the cannery wharf; a sunken ledge extends 200 yards 282° true (WSW 1/2 W mag.) from the rock. There is a depth of about 30 feet at the cannery wharf, but about 100 feet southwestward a shoal extends outside the line of its face.

From the northwest side of Long Island a group of islands and rocks extend 5 miles northwestward, two of the larger ones being Aston and Grand Islands. Square Island, the westerly one of the

group, is small, wooded, and named from its shape. A rock, with 6 feet over it and marked by a buoy, lies 1 mile west-northwest (mag.) of Square Island. This is the westernmost danger of this group.

DIRECTIONS, KAIGANI STRAIT.

These waters have not been carefully examined, and the strait should be used with caution, especially in Howkan Narrows.

Approaching the southeastern entrance of Kaigani Strait give the islands on the southwest side, about 2½ mile above Cape Muzon, a berth of about ¾ mile, and avoid a kelp patch lying about ½ mile off Kaigani Point. Follow a mid-channel course, favoring somewhat the south shore in approaching American Bay.

When abreast of American Bay, head for a mid-channel position southwestward of a small island with Indian graves on it about 400 yards southward of Howkan and near the shore. From this position steer for the eastern end of Channel Island; pass between Howkan Reef and the shoal opposite, at which point the channel is only 300 yards wide. When ¼ mile past Howkan, and within ⅜ mile of Channel Island, head for a mid-channel position southwestward of the western end of Channel Island. Then follow the western shore at a distance of 300 yards to West Mill Rock.

TLEVAK STRAIT AND NARROWS

shown in parts on charts 8151 and 8153, separates Sukkwan and Prince of Wales Islands on the northeast from Dall Island on the southwest and extends from Cordova Bay and Kaigani Strait, at the north end of Long Island, to Ulloa Channel. From Cordova Bay the main channel of Tlevak Strait trends westward for 10 miles to McFarland Islands and then northwestward for 14 miles to Tlevak Narrows; the width of the strait varies from 1½ to 4 miles. Islands are numerous, and the shores are much indented.

The group of islands extending 5 miles northwestward from the northwest end of Long Island is described on page 101.

Grace Harbor, Vesta Bay, and Rose Inlet, on the southwest side of Tlevak Strait, are described on page 101.

Lacey and Jackson Islands, on the north side of Tlevak Strait at the entrance from Cordova Bay, are described on pages 97 and 98.

Kasook Inlet, making into the southern shore of Sukkwan Island 2 to 3 miles westward of Jackson Island, has a cluster of small, wooded islands in its entrance, with a good, clear channel on either side. Just inside the islands the inlet divides. The northwest branch is 1½ miles long in a northwesterly direction and a mid-channel course is clear, except at a point about midway of its length, where there is a ledge projecting from the northeast side three-fourths of the way across the inlet. On the northeast side, at the head of the inlet, good anchorage can be had in about 12 fathoms, soft bottom. The other branch has a northerly direction for about ¾ mile to a bay ½ mile or more in diameter, from which a short arm extends eastward. There is good anchorage in about 10 fathoms, soft bottom, just inside the entrance to the short easterly arm, favoring the southerly shore to avoid a rock with 6 feet over it.

McFarland Islands are a group of large and small islands, 3½ miles long, on the eastern side of Tlevak Strait. The southernmost island is nearly 2 miles long, bluff, high, and prominent, and lies 1¼ miles northeastward of Reef Point.

Baldy Bay lies on the southwest side of Tlevak Strait southwestward of McFarland Islands, and is over 2 miles wide at its entrance between High Point and Reef Point. It has two large arms, known as Coco Harbor and View Cove, and a small bight. Reef Islands lie off the entrance to Coco Harbor. The bay has not been examined. A rock, bare at half tide, lies ½ mile east-southeastward of Reef Point.

Corlies Islands are a group of wooded islands about 1¾ miles in diameter on the northeast side of Tlevak Strait south of the entrance to Sukkwan Strait.

Sukkwan Strait (South Pass) is described on page 99.

Nichols Islands, 6 miles above Reef Point, are a group of wooded islands 2 miles long and 430 feet high. The Sentinels are a scattered group of five small wooded islets, with covering rocks among them, lying about 1 mile northwestward of Nichols Islands.

A rock, with 17 feet over it, lies 3 miles 324° true (NW by W ⅞ W mag.) from the southwest point of Nichols Islands and slightly southwestward of a line from this point to Guide Island.

Breezy Bay lies on the southwest side of the strait abreast Nichols Islands, and is 2 miles wide between Eolus and Boreas Points. It is divided into two arms, and there are several small islands and numerous rocks in the bay. It does not appear to afford an anchorage. **Eolus Point**, on the southeast side at the entrance, is high, steep, and rocky, and is joined to the shore by a narrow neck, thinly wooded. There is a wooded island close to **Boreas Point.**

Farallon Bay lies on the southwest side of the strait 9 miles above McFarland Islands, and is about 1 mile long in a south-southwest direction. Enter in mid-channel, taking care to avoid two rocks, covered at half tide, lying about 300 yards east-northeast of the northwest point at the entrance. The bottom is rocky and very broken; southeasterly winds draw through it, and it is not recommended as an anchorage for vessels. Just southeast of the southeast entrance point of the bay is a high-water islet which shows from southeastward.

North Bay lies on the southwest side of the strait 10½ miles above McFarland Islands and 2¾ miles southeastward of Tlevak Narrows, and is about 1½ miles long in a south-southwest direction. When entering favor the southeast side to avoid a reef making off from the northwest point at the entrance toward mid-channel. Anchor near the head of the bay, in 12 to 15 fathoms, soft bottom, with the high-water islet at the head bearing about west-southwest (mag.). This is an uncomfortable anchorage because of the southeast winds drawing around Cayman Point and blowing directly into the bay with hard squalls and williwaws.

Halibut Nose is the promontory on the northeast shore of Tlevak Strait opposite Farallon Bay and is included between North Pass of Sukkwan Strait and Soda Bay. It is irregular in outline and not so high and prominent as some of the other headlands in Tlevak Strait.

Guide Island, 1⅛ miles westward of Halibut Nose, is small, 130

feet high, and wooded; there are a number of covering rocks for ¼ mile north-northwest of it, and there is kelp around it.

Lively Islands are 1¼ miles in length, 175 feet high, and wooded. There are several outlying rocks, 100 to 200 yards off the islands, marked by kelp and mostly covered at high water. The currents have considerable velocity around the Lively Islands group, and swirls occur in places.

In passing Lively Islands the channel southwestward of them is considered the main channel, favoring the Dall Island shore slightly.

The channel northeastward of Lively Islands is deep and safe and is largely used by small craft bound northward, but it has two dangers that must be avoided. The first is a rocky patch, bare at extreme low water and marked by kelp, which lies ½ mile northeast of the southeasternmost of the Lively Islands group. The second danger is a rocky patch, bare at extreme low water and marked by kelp, which lies 240 yards northeastward of the northwesternmost large island of the group.

Round Island, ⅜ mile northward of the northwesternmost large island, is a large grass-covered rock about 20 feet high with a small clump of trees near its southwest end. It is steep-to on all sides.

Midway Island is a small wooded islet in the middle of the strait about ¾ mile northwestward of Lively Islands and the same distance east-southeastward of Block Island. Midway between it and Lively Islands and ¼ mile from the southwest shore of Tlevak Strait is a large kelp patch around a rock that uncovers. From this rock scattered kelp parallels the shore northwestward to a patch lying south of Midway Island. The channel between these kelp patches and the southwest shore is about ¼ mile wide with deep water.

Block Island is 200 yards in diameter, 160 feet high, and heavily wooded. The south side of the island is bold-to. The narrow passage northeast of the island is foul, and the currents are unusually strong in it.

Turn Point, at the northwest end of Dall Island, is a bluff, wooded knoll, 316 feet high. Foul ground extends 300 yards southeastward and 125 yards northwestward from the point.

Tlevak Narrows (Chart 8153), locally known as **The Skookum Chuck,** is a narrow and comparatively deep passage between Block Island and Turn Point and connects Tlevak Strait and Ulloa Channel. One-half mile west of Turn Point is a 3-foot shoal, marked on its south side by a buoy; the buoy is reported to tow under during the large tides. The channel south of the buoy is the one generally used.

Good **anchorage** for small craft in 4 fathoms, soft bottom, can be had in the small cove on the north side of Tlevak Narrows, the entrance to which is ½ mile about north by west (mag.) of Turn Point.

Currents in the vicinity of Tlevak Narrows run very strong during the large tides; in the narrowest part the average velocity of the west-going stream at strength has been estimated at from 4 to 8 knots and the east-going stream 2 to 4 knots. Soon after passing through the narrows the current is greatly diminished in strength, and beyond Guide Island and Meares Island it is almost imperceptible.

Slack water occurs 3 hours and 50 minutes after the time of high and low water at Sitka. With the large tides there is very little slack, while with the small tides slack water lasts from 10 to 30 minutes, and there is not much current for one hour on either side. The

current on the last two hours of the falling tide and first four hours of the rising tide sets southeastward; and the current on the last two hours of the rising tide and first four hours of the falling tide sets northwestward.

On the northeast side of Lively Islands, and halfway to Midway Island, the current sets constantly northwestward, being stronger when the main stream southwest of the islands sets northwest. Small craft bound northward usually pass northeast of the Lively Islands, in order to take advantage of this constant set.

The current setting northwestward divides into two parts off the eastern end of Ulloa Island, one part setting northward of the island, and the other setting with considerable strength into Meares Passage.

DIRECTIONS, TLEVAK NARROWS.

Pass ¼ mile southwest of Guide Island and the southeast Lively Island and then keep the southwest shore of the strait aboard, distant 250 yards, until nearing the narrows. Favor the Block Island side in the narrows, and round Turn Point at a distance of 200 to 250 yards. Pass the same distance southward of Ulloa Island and northward of Meares Island.

ULLOA CHANNEL

(chart 8151) is 9 miles in length from Tlevak Narrows to Bucareli Bay. For a distance of 3 miles from Tlevak Narrows it leads between the islands at the northern end of Meares Passage, and has a width of about ¼ mile. It then leads between Suemez and Prince of Wales Islands, where its width is ¼ mile at its eastern end, and 1¼ miles at its western end at Cape Flores, where it joins Bucareli Bay.

Ulloa Island, close to the western end of Tlevak Narrows, is ⅝ mile long, and wooded. The main channel lies close southward of the island.

Bush Islets lie ¾ mile southwest of Turn Point and are two rocks with a single tree. A rock, with 9 feet over it and marked by kelp, lies 200 yards north of the islets.

A wooded islet, with surrounding kelp, lies ⅜ mile westward of Bush Islets.

Meares Island, 1¾ miles westward of Tlevak Narrows, is the largest island in Ulloa Channel. The main channel is north of the island, the north side of which is bold-to. There is a rocky islet 275 yards southeast of Meares Island, with rocks and kelp between.

Meares Passage is described on page 119.

Anchorage in 10 to 15 fathoms, soft bottom, near Tlevak Narrows can be had in Ulloa Channel, at the entrance to a small passage which lies on the northwest side of the largest island north of Ulloa Island, between it and the main shore of Prince of Wales Island. A kelp patch is reported a short distance southwest of the west point at the entrance. Ulloa Island, and the island 160 feet high west of it, can be passed on either side.

Ridge Island, the name applied to the northeast end of Suemez Island, is ½ mile long and wooded, and is joined to Suemez Island by a sandy neck, awash at high water. On the south side of the island is a wooded islet connected with the point by a spit bare at half tide.

Waterfall, on the northeast side of Ulloa Channel 5 miles west of Tlevak Narrows, is a cannery and store at which some fishermen's supplies, gasoline, and distillate can be had. The wharf has a depth of about 19 feet at low water.

Port Refugio is a large bay, having two arms, on the southwest side of Ulloa Channel opposite the cannery at Waterfall. Its southeast arm, inside of **Point Bocas**, is 1 mile long, ¼ mile wide, and near its head affords anchorage for small craft in about 12 fathoms. The southwest arm has not been closely examined.

Adrian Cove, on the southwest side of Ulloa Channel near its northwest entrance and 2 miles above Port Refugio, is a small bight, in the southeast corner of which secure anchorage for small craft can be found in 10 to 15 fathoms, soft bottom.

Cape Flores, on the northeast side of Ulloa Channel at its northwest entrance, is the western point of an island, ⅜ mile long and wooded, known as **Joe Island**. Rocks bare at low tide and foul ground, marked by kelp, extend ¼ mile northwest of Cape Flores. The channel on the northeast side of Joe Island is largely used by small local craft.

Bucareli Bay, the northeastern end of which forms a part of the protected route on the west coast of Prince of Wales Island, is described on page 120.

KLAWAK INLET

(chart 8155) is about 5 miles long and ½ to 1 mile wide. It can be entered either southeastward of **Fish Egg Island**, or northwestward of the island between it and Klawak Reef. The former entrance, although buoyed, should not be attempted by large vessels without local knowledge. The entrance northwest of Fish Egg Island is difficult and dangerous for vessels of a greater draft than 20 feet without local knowledge. The depths in the inlet are in general good, except at the south end, where there are numerous shoals.

Craig is a small town and post office on the east side of the channel at the south end of Klawak Inlet, abreast the south end of Fish Egg Island. It has a cannery sawmill, and several stores at which provisions and fishermen's supplies can be obtained. The cannery wharf has a depth of about 15 feet, but it is difficult of approach. Good anchorage can be had off the town. Two and one-half miles eastward of Craig, and on the northwest side of **Port St. Nicholas**, is a hill 2,940 feet high and bright green in summer, which shows conspicuously for a considerable distance southward and westward.

Craig can be approached from northward or southward, both channels being buoyed and used, but the channel from northward has the deeper water. A shoal extends northwestward from the cannery at the western end of Craig.

Klawak Reef, northwest of the northwest end of Fish Egg Island, is four groups of rocks, bare at low water, extending from near Clam Island southward toward Fish Egg Island. The southernmost group is marked by a spindle maintained by a cannery company, but an unmarked rock, with 22 feet over it, lies 210 yards 142° true (ESE mag.) from the spindle. A rock, with 20 feet over it, lying over ¼ mile 277° true (WSW mag.) from the spindle, is marked on its south side by a buoy.

Two rocks, bare at half tide, lie nearly ⅜ mile 277° true (WSW mag.) from the northwest point of Fish Egg Island. A rock, bare at low water, lies 100 yards off the point, and a rocky patch, with 13 feet over it, lies over ⅜ mile 272° true (SW by W ½ W mag.) from the point.

Enter Klawak Inlet on about a 103° true (ENE ½ E mag.) course with the southernmost point of Parida Island astern.

Klawak Harbor is a narrow and shoal body of water on the northeast side of Klawak Island. There is a cannery and a fertilizer plant about the middle of the east side of Klawak Island, and water can be had at the wharf. There is a good store near the cannery and a native village on the northeast side of the harbor opposite the cannery.

The approach to the harbor is narrow and rocky. A ledge extends about 125 yards north from Klawak Island and is marked at its extremity by a spindle. On the opposite side of the channel is another rock marked by a spindle. Ice forms in Klawak Harbor in winter and frequently carries away these spindles.

Above Klawak a large body of water extends inland some 10 miles or more. It is not surveyed and little is known of it.

SAN ALBERTO BAY

(chart 8155) extends 7 miles northwestward from Bucareli Bay to San Christoval Channel. The principal channels have been closely surveyed; the northerly corner, which is little used, has not been examined. San Alberto Bay has numerous shoals and broken areas, as shown on the chart.

Balandra Island, small, 115 feet high, and wooded, lies ¾ mile north of the north end of San Juan Bautista Island at the junction of Bucareli Bay and San Alberto Bay. Foul ground extends 250 and 100 yards off the east and west ends, respectively, and a 15-foot spot lies ¼ mile north of the island. The channel between Balandra Island and San Juan Bautista has been carefully surveyed, but it has not been examined by means of a wire drag; the least depth found is 28 feet.

Ballena Islands, two in number, 120 feet high, and wooded, lie 1¼ miles northward of Balandra Island and about the same distance southward of Fish Egg Island. Between Ballena Islands and Fish Egg Island the bottom is foul. A reef, with a least depth of 10 feet, lies ⅜ mile southward of the western Ballena Island, with an extensive kelp patch between.

Ballena Island Shoal, with a least depth of 11 feet, lies ⅝ mile southwestward of the western Ballena Island. It is marked on its western side by a buoy.

Balandra Shoal consists of two small areas ¼ mile apart, having a least depth of 7 feet on each, and with deep water between the two. It lies a little over 1 mile northwest of Balandra Island and about the same distance west-southwest of the western Ballena Island. The shoal is not marked by kelp. The northerly area is marked by a buoy on its eastern side. The usual course in passing Balandra Shoal leads eastward of it, between the buoys marking it and Ballena Island Shoal.

Fern Reef, about 1½ miles westward of Balandra Shoal and about 1 mile off the San Fernando Island shore, shows two rocky heads ¼ mile apart, bare at low-water springs. The reef is marked by some kelp.

Parida Island Reef lies ½ mile south-southeastward from Parida Island. One head bares at low-water springs. A depth of 4 fathoms is found ½ mile east-southeast of this reef and about 1 mile southeast of Parida Island; the depth may be less.

Parida Island stands out prominently in the middle of San Alberto Bay. It is ¼ mile in diameter, 110 feet high, and wooded.

Klawak Reef and the entrance to Klawak Inlet northwest of Fish Egg Island are described on page 106.

Alberto Islands lie northwestward of Fish Egg Island and Klawak Reef in the unsurveyed part of San Alberto Bay. The southernmost island is about 1¾ miles northwest of Fish Egg Island and the same distance northeast of Parida Island; it is 130 feet high and wooded.

Alberto Reef extends ⅜ mile southwestward from the southernmost Alberto Island; its highest point is bare 5 feet at low water.

Three rocky patches, covered by about 5 feet at low water, lie 1⅛ miles northwestward of Parida Island. They are marked by a buoy off the northernmost patch. Kelp does not grow on the patches some seasons. The range of the southwest end of Parida Island and the northeast end of San Juan Bautista Island passes a little northeastward of the patches.

The Witnesses, locally known as **Hour Islands**, are two wooded islets 1¾ miles north-northwestward of Parida Island.

Witness Rocks, ⅞ mile west of The Witnesses, have no trees, and are nearly covered at high water.

DIRECTIONS, SAN ALBERTO BAY.

Pass between San Juan Bautista and Balandra Islands, favoring the former, on about a 333° true (NW by W mag.) course. When Balandra Island is a little abaft the beam, steer 18° true (N by W mag.) for 1¼ miles, with the 1,990-foot summit of San Juan Bautista astern and Alberto Island ahead. When midway between the buoys marking Balandra Shoal and Ballena Islands Shoal, steer 359° true (NNW ¾ W mag.) for 3¾ miles, with the west end of Balandra Island astern and the Witnesses ahead. When 1 mile past Parida Island, steer 300° true (W mag.) for San Christoval Channel, with Alberto Island astern, and pick up the range beacons on the northwest Cruz Island.

For directions, San Christoval Channel, see page 109.

SAN CHRISTOVAL CHANNEL

(charts 8155, 8157) is the passage leading westward from San Alberto Bay to the Gulf of Esquibel. There are numerous islands, reefs, and shoals, with three passages between them, all of which present difficulties for vessels of any size, owing to the narrowness of the passages and the strength of the currents. San Christoval Channel has been closely surveyed (but not with a wire drag) and the dangers are shown on the charts. The dangers are mostly marked by kelp in summer, but this is not an invariable rule.

Catalina Island, near the eastern end of San Christoval Channel ½ mile off the southerly shore, is small, 140 feet high, and wooded. Rocks and foul ground extend ¼ to ⅜ mile northeastward, northward, and westward of the island.

Piedras Island, ⅝ mile northwest of Catalina Island, is a wooded islet, 75 feet high. Kelp extends 200 yards northwestward from the island.

Cruz Islands are a group 1¼ miles long, level and wooded, lying close to the south shore of the channel, with deep water between them and shore. A 13-foot spot lies 350 yards north-northwest of the northwest point of the islands.

San Christoval Rock, with 6 feet over it and marked by a buoy off its southeast side, lies about midway between Piedras Island and the easternmost Hermanos Island. The rock is surrounded by a heavy bed of kelp which, however, tows under when the current is running strong. Cruz Island Range consists of two beacons erected on the northwest Cruz Island to lead close southward of the buoy and in the best water. The bearing of the range is 300° true (W mag.).

Hermanos Islands, four in number, small and wooded, lie about ½ mile north-northwestward of Piedras Island.

Rosary Island is the largest island of the group which lies near the northerly shore of San Christoval Channel at its narrowest part. All the islands of the group are low and wooded.

The channel on the north side of the Rosary Island group is almost invariably used by small craft. They follow the general trend of the main shore at a distance of about 250 yards.

Tuft Rock lies 400 yards southeast of Larzatita Island; it is small and bare, and covers only at extreme high water.

A rocky patch, with 20 feet over it and marked by a buoy on its south side, lies about 350 yards east by north (mag.) from Tuft Rock.

A rocky patch, with 25 feet over it, lies 600 yards northeast (mag.) from Tuft Rock.

Larzatita Island is 115 feet high and wooded. It is the westernmost of the islands near the middle of San Christoval Channel, and there is a good channel on either the north or south side.

Larzatita Island Reef, marked by kelp and awash at half tide, lies 300 yards north-northwest of Larzatita Island. Its northern extremity is marked by a buoy.

DIRECTIONS, SAN CHRISTOVAL CHANNEL.

Large vessels pass ½ mile north of Catalina Island and steer 300° true (W mag.), keeping on the range on the northwest Cruz Island, ahead, and the south end of Alberto Island astern until Piedras Island is abaft the beam. Then change slowly to 331° true (NW by W ¼ W. mag.) with the south tree line of Piedras Island and the north tree line of Catalina barely open in range. Continue on this course for 1½ miles until past the buoy off the north point of Larzatita Island Reef.

The passage south of Larzatita Island may be used by holding the 331° true (NW by W ¼ W mag.) course for only about ½ mile, and then steering 285° true (WSW ¾ W mag.) with two beacons on the northerly Hermanos Islands on range astern. Pass southward

of the buoy which is stationed eastward of Larzatita Island, and when past Larzatita Island steer as desired, taking care to avoid the shoal spots ½ mile northward of **Palisade Point.**

The first of these routes offers the advantages of having fewer courses, lesser cross-currents, and a good natural range.

Small craft generally use the channel northward of Rosary Island group, following the general trend of the Prince of Wales Island shore at a distance of about 250 yards; the chart is the guide.

GULF OF ESQUIBEL

(chart 8157) is 8 miles long from Noyes Island to Tonowek Bay, and 6 miles wide from San Fernando Island to the San Lorenzo and Anguilla Islands. It is clear of islands and connects by several passages with the sea. The southern part of the bay has not been examined (1917); the northern part has been closely surveyed, but not examined by means of a wire drag.

Portillo Channel is described on page 121.

Kelley Cove, at the north end of **Noyes Island,** is the site of a cannery and affords anchorage in 15 fathoms, good holding ground.

A dangerous rock, bare at low water and marked by kelp, lies ½ mile off St. Philip Island at a point 1⅜ miles 311° true (W by N mag.) from the west point of Blanquizal Island.

Curacao Reef lies ¾ mile southwest (mag.) of Culebra Island with deep water between. The reef has a least depth of 3 feet, is small in extent, and is marked by a buoy off its southwest extremity.

Blanquizal, St. Philip, and **Culebra Islands** are three groups in the northeastern part of the Gulf of Esquibel close to the Prince of Wales Island shore, distant 3, 5, and 6 miles, respectively, northwestward of San Christoval Channel. They are comparatively low and heavily wooded. At the southeast end of St. Philip Island is an old Indian village, known locally as **Bobs Place.** Fair anchorage for moderate sized vessels can be had in mid-channel off the village.

Small craft with local knowledge pass close northward of the 105-foot and 260-foot Blanquizal Islands, and thence inside all islands of the St. Philip and Culebra groups. In the Blanquizal Islands group the channel has a least depth of 11 feet at low tide, but great care is required to avoid several rocks which show at some stage of the tide. A rock, bare at low water, lies 300 yards southeastward of the 130-foot island off the southeast end of St. Philip Island.

BOCAS DE FINAS TO CAPE LYNCH.

Bocas de Finas (chart 8157) is the passage from the junction of Gulf of Esquibel and Tonowek Bay to Iphigenia Bay, and lies between Heceta Island on the north and Anguilla and Twocrack Islands on the south. Its width is 1⅜ miles at the eastern end and ¾ mile at Twocrack Island.

A rock, barely covered at low water and surrounded by kelp, lies ¼ mile southeastward of Point Desconocida; it is marked by a buoy on its southeast side. Between the rock and the shore the ground is broken.

The **Heceta Island** shore in Bocas de Finas is steep, and stands out prominently from either direction. There are no outlying dangers.

Off the south shore of Bocas de Finas the bottom is foul for nearly ¼ mile, and should be avoided.

Bushtop Islet is 45 feet high and conspicuous. One hundred yards northeast of it is a small, bare rock.

There is a secure anchorage in the western bight on the north side of Anguilla Island about ½ mile southward of Bushtop Islet. When entering, pass about 200 yards eastward of Bushtop Islet and stand in on a southerly course. Anchor in 12 to 15 fathoms, soft bottom. There is kelp and broken ground on the western side of the anchorage.

Twocrack Island is nearly ⅜ mile in diameter, 277 feet high, wooded, and has two prominent crevices extending through it, which, however, can be seen only from northward or southward.

From Bocas de Finas to Cape Lynch the coast is rugged, with numerous outlying islets and reefs, most of which show above water. The main passage follows the general trend of the shore line at a distance off, varying between ¼ and ½ mile.

White Cliff, on the Hecta Island shore, is a precipitous wooded point with white cliffs 100 feet high. Three-fourths of a mile southeastward of White Cliff is a conspicuous landslide extending down to the water from near the summit of the ridge.

Emerald Islet, on the southwest side of the main passage, is 45 feet high and has several clumps of stunted spruce. A buoy, ½ mile northward of Emerald Islet marks the outer limit of dangers on the south side of the passage.

Dead Tree Point juts out from the higher land of Heceta Island, and is low and wooded, with bare cliffs at the water. Opposite Dead Tree Point, and distant ⅝ mile, is a large bare flat rock, and ¾ mile northwestward of this rock is a smaller one.

Gull Islet, 87 feet high and bare, lies 2¼ miles west of Emerald Islet.

A group of bare rocks, with contiguous foul ground, lies 1 mile north-northwestward of Gull Island and 1¼ miles south-southwestward of Cape Lynch.

Cape Lynch is at the western end of Heceta Island. A kelp-marked ledge, with 2 to 4 fathoms over it, extends ⅝ mile northwestward from the cape.

Currents have a maximum velocity of about 2 knots between Emerald Islet and Dead Tree Point.

DIRECTIONS, BOCAS DE FINAS TO CAPE LYNCH.

From Twocrack Island to Cape Lynch the passage is exposed to the swell from seaward; during and after gales vessels using the passage are confronted with a disagreeable beam sea which breaks furiously over the rocks on both sides.

From a mid-channel position northward of Bushtop Islet, steer 302° true (W ¼ N mag.) for 3 miles with Emerald Islet ahead. When within about ⅝ mile of the islet, steer 356° true (NW by N mag.) for 1 mile with Dead Tree Point ahead. When a little past the buoy on the southwest side of the channel, steer 320° true (WNW ¼ W mag.) for 2¾ miles with White Cliff astern. Cape Lynch should then be abeam.

TONOWEK BAY

(chart 8157) extends north-northeastward for about 6 miles from the Gulf of Esquibel to Tonowek Narrows and forms the eastern side of Heceta Island. With the exception of a rock awash at high water, which lies near mid-channel 7/8 mile south of the 1085-foot hill on Heceta Island, the survey shows the mid-channel to be clear, but it has not been examined with a wire drag.

Warmchuck Inlet, on the northwest side of Tonowek Bay 3 miles northward of Point Desconocida, has considerable foul ground, as indicated on the chart. A rock, with 3 feet over it at low water and marked by a buoy, lies 1/2 mile northeastward of a well-defined point on the southwest shore. There is a cannery and wharf 7/8 mile west of the point; the wharf has a depth of about 17 feet, and fresh water is obtainable. One-half mile northeastward of the cannery is a group of wooded islets; rocks, bare at one-quarter ebb, lie 150 yards southward of the group.

Nossuk Bay, on the southeast shore of Tonowek Bay 1 mile southward of Tonowek Narrows, is 2 miles in length and largely filled with islands and shoals. **Nossuk Anchorage**, in the northern part of the bay 1/2 mile south of Tonowek Narrows, affords excellent anchorage in 10 fathoms, soft bottom. The entrance, although narrow, has been examined with a wire drag, and the least depths are shown on the chart.

Tonowek Narrows, locally known as **Little Skookum Chuck**, connects Tonowek Bay and Karheen Passage. It has a least width between the 3-fathom curves of 230 yards, and the mid-channel has been examined to a depth of 27 feet with a wire drag and found clear.

Currents set through Tonowek Narrows about north (mag.) with an average velocity at strength of 2.7 knots, and about south-southwest (mag.) with an average velocity at strength of 3 knots. They are accompanied by tide rips and swirls, but they are seldom dangerous even to a small boat. The current changes from north-setting to south-setting 40 minutes before the time of high water at Sitka, and from south-setting to north-setting 35 minutes before the time of low water at Sitka. The current runs strongest off the south point of the island, locally known as the **Doctor's Grave**, which lies midway of the narrows on the west side.

Small craft plying between San Christoval Channel and Tonowek Narrows pass eastward of the group of islands lying northward of the Culebra Island group. The mid-channel is safe and partially sheltered.

Directions for Tonowek Narrows are given under the following heading.

KARHEEN PASSAGE

is the name applied to the body of water lying between Tonowek Narrows and Sea Otter Sound. The southeastern part of the passage (shown on chart 8157) is characterized by islets, ledges, and generally broken ground, surrounded by comparatively deep water. Much of the area is filled with kelp. The route described in the directions has been verified by means of a wire drag to a depth of 27 feet in a width of 250 yards or more from Tonowek Bay to Karheen

Cove, and it is used by vessels of about 17 feet draft. The channel is marked by buoys as far as Karheen Cove.

Tuxekan Passage connects Karheen Passage with El Capitan Passage and lies between Tuxekan Island and Prince of Wales Island. From Karheen Passage to Staney Island the shores, islands, rocks, and kelp patches of Tuxekan Passage are correctly shown on the charts, but no sounding has been done.

Ham Islands are a group of several wooded islets lying 1½ miles north of Tonowek Narrows.

Trim Islet lies ½ mile northeastward of Ham Islands, close to the Tuxekan Island shore.

Cob Islet lies ¼ mile west of Trim Islet and 1 mile southeastward of Karheen Cove. Reefs extend 150 yards southward and westward from Cob Islet.

For 1½ miles northwestward from Cob Islet, Karheen Passage has an average width of ½ mile. The depths are generally good except for an extensive kelp-marked ledge, with a least depth of 9 feet over it, which lies in mid-channel southwestward of Karheen Cove.

Karheen Cove is a small indentation on the north side of Karheen Passage, on the shore of which is located a native village, cannery, and wharf. A ledge extends 300 yards southward from the southeast point at the entrance. Peep Rock is a conspicuous treeless rock ¾ mile west-northwestward of Karheen Cove.

DIRECTIONS, TONOWEK NARROWS AND KARHEEN PASSAGE.

Favor the northwest shore of Tonowek Narrows and round Point Swift about midway between it and a half-tide rock ¼ mile northward, passing southward of a black buoy 350 yards southward of the rock. **Point Swift** is on the east side at the north end of the narrows.

When ⅜ mile northeastward of Point Swift and the Tuxekan Island range beacons are in line, steer for them on a 37° true (N ⅝ E mag.) course for 1⅝ miles, passing close eastward of a black buoy and 400 yards westward of a red buoy.

When within ¼ mile of Tuxekan Island and the range on the south side of Karheen Passage shows to the right of Ham Islands, swing slowly on to the range, which should be held closely to avoid dangers, course 308° true (W ¾ N mag.).

When a red buoy and the west tangent of Cob Islet are abeam, head for the cannery on a 349° true (NW ⅜ N mag.) course until the north sides of Cob and Trim Islets are in range.

Hold this range, course 314° true (WNW ¾ W mag.), pass a red buoy, and when Karheen cannery is abeam, head for it.

From Karheen Cove follow the north shore at a distance of about 200 yards, pass in mid-channel northward of Peep Rock, and then steer about 311° true (W by N mag.) to Sea Otter Sound.

SEA OTTER SOUND

extends westward from Karheen Passage and Tuxekan Island along the north side of Heceta Island to Davidson Inlet. Its northwest shore is formed by numerous islands, large and small. The sound

is about 6 miles in diameter with depths of 17 to 75 fathoms, irregular bottom. There are few desirable anchorages in the sound; with the assistance of the chart, depths suitable for anchorage can be found on its eastern side, but care is required on account of sunken rocks, which are, however, generally marked by kelp during the summer.

Gas Rock, wooded, lies 5/8 mile from Heceta Island and 4 miles east-northeastward of Whale Head. **Clump Islet**, 3 miles northeast of Gas Rock, is the outer one of a group lying 1¼ miles southeastward of Eagle Island, with foul ground between.

EL CAPITAN PASSAGE

has its entrance on the north side of Sea Otter Sound 4 miles northeast of Clump Islet. It extends about 18 miles in a general north-northwesterly direction from Sea Otter Sound, with an average width of less than 1 mile, and then trends westward for 2 miles to El Capitan. From El Capitan to Shakan Strait, a distance of 5 miles, the passage is narrow, foul, and in one place dry at low water, and is called **Dry Pass**. The channel in Dry Pass is usually marked by buoys maintained by local interests. El Capitan Passage is not surveyed, but is navigable for vessels of moderate size from Sea Otter Sound to El Capitan and for small craft to Shakan Bay.

Sarkar Cove, on the east side of El Capitan Passage about 6 miles from Sea Otter Sound and 20 miles from Shakan, affords good anchorage in 6 to 8 fathoms. To enter from southward, pass between the small easterly island (Indian graves on eastern end) of the group in El Capitan Passage and a ledge covered at high water. Pass northward of this ledge and southward of other ledges, covered at high water, and enter in mid-channel.

Carheen Cove, on the east side of El Capitan Passage about 11 miles from Sea Otter Sound and 15 miles from Shakan, affords anchorage in about 10 fathoms in the middle of the cove.

El Capitan is a quarry on El Capitan Passage about 20 miles above Sea Otter Sound and 6 miles from Shakan. There is anchorage near the islet about ⅓ mile from the mill, in 8 to 10 fathoms.

Enter El Capitan Passage between Hoot and Tuxekan Islands. The course is then northward along the west side of Cap Island, and midway between its north end and Dot Island. Then nearly north (mag.) for about 2½ miles, keeping in mid-channel through the narrow passage and passing about ¼ mile eastward of Hub Rock. Care should be taken and the lead used in passing through the group of islands about 1½ miles northward of Hub Rock, for although the least water found was 3½ fathoms the channel was not thoroughly examined.

From Hub Rock the course is about northwest by north, heading to pass between the second and third islands from eastward. An islet with dead fallen timber lies northward of the third island. Pass about 100 yards eastward of the islet and then steer more northwestward to avoid a kelp patch making out about 300 yards from the next island, which is left on the starboard hand; continue the course past the island to avoid a kelp patch above it, and then steer about north by west, following the western shore at a distance of about 400 yards. When past the next point on the west side continue the same general course to mid-channel. Off the point on the west shore,

about 3 miles above the islet with fallen timber, is a rock awash at highest tides. Pass in mid-channel eastward of the rock and follow a mid-channel course to El Capitan.

DAVIDSON INLET.

has its entrance on the eastern side of Iphigenia Bay 7 miles east-northeastward from the southern end of Warren Island. From its entrance the inlet extends north for 14 miles, with a width of 4 to 6 miles in its lower part and ⅜ mile at Holbrook near its head. The shores and islands in the inlet are wooded and generally high. On its east side the inlet is separated by a number of islands from Sea Otter Sound. The inlet is separated from Iphigenia Bay by a chain of islands, 3¼ miles long, among which are passages suitable only for boats. **Whale Head Island**, the southernmost of the chain, is 490 feet high, and its southern end, called **Whale Head**, is a prominent cliff 50 to 300 feet high.

The entrance to Davidson Inlet from Iphigenia Bay is between Whale Head and Heceta Island, and is nearly 2 miles wide. **Whale Rock**, bare at half tide, lies ½ mile south of Whale Head; and a reef, with 14 feet over it and a heavy break with a moderate swell, lies ½ mile southeastward of Whale Head. A rock, with 9 feet over it, lies 1½ miles southwestward from the northwest end of White Cliff Island. By keeping in mid-channel all dangers will be avoided.

Port Alice, on the south side 2¾ miles east of Whale Head, is a secure anchorage. It is 2 miles long, 1 mile wide at its entrance, and ¼ mile wide at its head. Near the middle of the port, ½ mile inside the entrance, is a low, bare rock from which a ledge extends 250 yards northward and westward; a ledge, bare at low water, lies 400 yards south-southeast of this rock. To enter, give the points at the entrance a berth of about ½ mile and enter in mid-channel. Follow the southwest side at a distance of 250 yards, passing westward of the bare rock, until about ½ mile from the head of the port, where good anchorage will be found in the middle in 14 to 18 fathoms, soft bottom. Fresh water can be obtained by boats from several small streams.

Edna Bay, on the western side 5½ miles northward of Whale Head, is ⅜ mile wide at its mouth and about 1¼ miles in diameter. It has good anchorage about ¼ mile from its southern and western sides, in 14 to 17 fathoms, soft bottom. Islets and foul ground make out ½ mile from the southwest end of the bay; and foul ground makes off, in the northern part of the bay, 600 yards from the western shore and 500 yards southward from an islet. An 8-fathom spot in the middle of the bay should be avoided in anchoring. The entrance is north of the islet in the mouth of the bay. **Green Island**, 1 mile southward of the entrance, is about ½ mile in diameter.

Tokeen is a marble quarry, wharf, and post office on the north side of the cove at the northwest end of Marble Island. The depth alongside the wharf is about 27 feet. The cove is shoal southward of the wharf. Anchorage can be had southwestward of the wharf in 14 to 17 fathoms. A rock, bare 9 feet at low water and usually marked by a private spindle, lies 300 yards west-southwestward from the northeast point of the cove.

Tokeen Bay, on the eastern side of Davidson Inlet 11½ miles northward of Whale Head, extends northeastward for 3½ miles, with a width of ½ mile at its entrance and nearly 2 miles at its eastern end. Its eastern side is connected by high-water boat passages with El Captain Passage. A rock, bare at low water and marked by kelp, lies 400 yards east-southeastward from the north point at the entrance, and another rock, with 4 feet over it and marked by kelp, lies near mid-channel, ⅞ mile east-northeastward from the north point at the entrance and 325 yards south-southeast of an islet; the channel southeastward of these rocks is clear. A shoal with 16 feet lies in the middle of the bay 2⅜ miles east-northeastward from the north point at the entrance, and ½ mile from the nearest islet on the northeast shore. Elsewhere in the bay a mid-channel course is clear, but there are rocks in places near the shores and care is required in its navigation. Anchorage can be found in the middle of Tokeen Bay, ½ mile east by north from the north point at the entrance, in 14 to 16 fathoms; also at the northern end, northeast side, and southeast end of the bay.

Marble Passage extends northward from the northeast part of Davidson Inlet between **Marble** and **Orr Islands.** Its approach is somewhat obstructed by rocks and ledges, but with local knowledge and care it can be navigated safely as far as the loading wharf of the marble company. This wharf is on the west side of the passage, 1¼ miles above the south point at the entrance; it has depths of 18 to 20 feet along its face. **Mission** is a marble quarry and float ¾ mile above the wharf; only small craft can go to the float.

To go to the wharf in Marble Passage, round **White Cliff Island** at a distance of ¼ mile and steer about 94° true (NE by E ¾ E mag.) for ¾ mile to a position ¼ mile southeastward of two rocky islets. Then with the range of the southeast point of White Cliff Island astern showing a little eastward of Dove Islet, steer 35° true (N ½ E mag.) for 1½ miles, following the range astern closely. This range leads close past sunken rocks, and great caution is necessary. When the wharf northwestward shows clear of the islands on the west side of the passage, head for it. **Dove Islet** is a small wooded islet ½ mile north of the southeast point of White Cliff Island.

WEST COAST OF DALL ISLAND.

The west coast of Dall Island from Cape Muzon to Meares Passage, a distance of 40 miles, is rugged and forbidding with numerous prominent, partially wooded mountain peaks near the coast, between which are several bays and harbors. The shore line has been partially surveyed, and some sounding has been done.

Wolk Harbor, 4 miles westward of Cape Muzon, is 1½ miles long in a northeasterly direction, ½ mile wide, and deep throughout; it affords fair anchorage for small craft.

Liscome Bay, 5 miles westward of Cape Muzon, is a little over 1 mile long in a northwesterly direction, ¼ mile wide, and clear in mid-channel. It affords anchorage for small vessels near the head, but is exposed to southeast weather and swell.

Point Cornwallis, 7 miles westward of Cape Muzon, is a prominent rugged headland, back of which is a conspicuous high mountain.

Security Cove, 3 miles northwestward of Point Cornwallis, is 2 miles long in an east-northeasterly direction, ⅛ mile wide at the

entrance, and ⅜ mile wide inside. It affords temporary anchorage for small vessels in a bight on the north side close inside the narrowest part of the entrance. A rock, which bares and usually shows a breaker, lies 325 yards off the southeasterly shore at the entrance.

Port Bazan is on the west side of Dall Island, 16 miles westward of Cape Muzon and 9 miles west-northwest of Point Cornwallis. It lies between two prominent mountain peaks about 5 miles apart. The northwestern mountain is 2,500 feet high and the top is a small bare tip; the southeastern mountain is 1,950 feet high, roughly the shape of a rounded cone, and heavily wooded to the top. Oftentimes when the tops of the other mountains are enveloped in fog or clouds the latter mountain, for some reason, appears to stand out clear. Port Bazan is about 3 miles in length, averages 1 mile in width, and is largely filled with islands of various sizes. **Dolgoi Island**, nearly closing the entrance, is 1½ miles long, ¾ mile wide, and 750 feet high. It is mound shaped and wooded, and stands out prominently from Dall Island when abreast of it. The seaward shore of the island is storm swept and bare of vegitation. Outside of Dolgoi Island is a group of four small islands close together, the outermost point of which is a precipitous, sharp pointed, bare rock, light brown to white in color, 125 feet high. A shoal, with 5 fathoms over it, lies ½ mile west of the sharp-pointed rock.

Port Bazan can be entered either southeastward or northwestward of Dolgoi Island, but the northwest entrance seems preferable. This entrance is about 125 yards wide, and late in the summer is lined on both sides with kelp.

Port Bazan affords the best **anchorage** on the west coast of Dall Island. It is thoroughly sheltered from outside swell, and the configuration of the mountains is such that it is reported that williwaws are never felt. The best anchorage is in a bight on the northwest side near the head, 2½ miles inside the entrance, in a depth of 12 fathoms, sticky bottom. Small craft can anchor in less depth at the head of the bay.

Enter Port Bazan in mid-channel northwest of Dolgoi Island, and pass midway between the two largest islands northeastward of Dolgoi Island.

Gooseneck Harbor, 4 miles northwest of the northwest entrance to Port Bazan, is 2 miles long in a northeasterly direction and is easily identified by a black rock, 65 feet high, close south of the entrance. The harbor is ⅛ to ⅜ mile wide; the upper half is greatly obstructed by bare rocks and ledges, and the head is especially foul. A rock, awash at extreme low water, lies near the middle of the entrance, 200 yards west-southwestward of a small islet off the southeast shore. In 1916 there was a mild-cure plant on the southeast shore 1½ miles inside the entrance.

In entering, follow the northwest shore at a distance off of ⅛ mile until ¾ mile inside the entrance. Anchorage for small craft can be had 100 yards off the northwest shore, 1½ miles within the entrance, after rounding the point on the northwest side.

Gold Harbor, 6 miles northwest of the northwest entrance to Port Bazan, is 3 miles long in a northeasterly direction, ½ mile wide, and is reported to be clear in mid-channel. On the northwest side near the entrance is a conspicuous, bare gray, slide extending half way

down the mountain side and visible 12 or 15 miles southeastward; the top of the slide is at an elevation of 1,560 feet.

Waterfall Bay, nearly 9 miles northwest of the northwest entrance to Port Bazan, is 3½ miles long in an east-northeasterly direction, ¼ to ¾ mile wide, and comparatively clear throughout. The entrance can be distinguished by a bold, bare point on the southeast side, and by a wooded islet, with off-lying bare, black rocks, in the middle. Near the head of Waterfall Bay are extensive deposits of marble on the slopes of **Twin Peaks**, two prominent bare summits, 2,600 feet high, lying ⅝ mile east of the head of the bay.

Enter Waterfall Bay in mid-channel northward of the wooded island in the entrance, and pass in mid-channel northward of the island near the middle of the bay 1½ miles inside the entrance. Anchorage can be had in the center of the head of the bay in 27 fathoms, sticky bottom. Heavy westerly weather draws through the bay with considerable force, but no swell comes in.

Small craft anchor in 5 to 10 fathoms on the northwest side of the bay close eastward of the small islands 1½ miles inside the entrance; and also in 5 fathoms, soft bottom, at the extreme head of the bay. The latter is said to afford good shelter at all seasons.

Cape Augustine, at the northwest side of the entrance to Waterfall Bay, has several bare, black rocks close to and rises boldly to a height of 500 feet, from which point it slopes gradually northeastward.

Forrester Island lies about 13 miles off the Dall Island shore, its south end being about 30 miles west-southwestward of Cape Muzon. It is 4½ miles long in a northwest and southeast direction, 1 mile wide, and wooded. It has four summits (the highest 1,400 feet), which make the island distinctive when seen from any direction. From southeastward or northwestward it appears especially precipitous on the southwest side. The southeast end of the island is a flat 400 to 500 feet high.

Petrel Island extends about 1 mile southeastward from Forrester Island and has two summits 300 feet high.

Northwestward of Forrester Island for 3 miles there are in succession **Sea Lion Rock**, 117 feet high, **Cape Horn Rocks**, 148 feet high, **Lowrie Island**, 291 feet high and wooded, and **North Rocks**, 25 feet high.

Breakers are numerous around the Forrester Island group, but for the most part they are close to shore or readily discernible. The most dangerous are off the southwest side of Forrester Island, one being 400 yards from its west-northwest point and another 750 yards offshore 1 mile southward of that point.

Currents have considerable strength in the vicinity of Forrester Island, usually setting north with the flood. Slack water is reported to occur about 1½ hours after the time of high or low water at Sitka. Tide rips are usually found around the island and in the passages between the rocks and at times are dangerous for small boats.

There are no secure anchorages at Forrester Island. During the summer months small fishing craft anchor in four different places at the north part of the island, namely, at Wood Cove, Eagle Harbor, the northwest end, and the first bight on the west side south of the northwest end. They anchor in the edge of the kelp, depths about 10 fathom rocky bottom. Fresh water can be had at a small stream in Eagle Harbor.

Wood Cove and **Eagle Harbor** are on the east side of the island 1⅜ miles and ¾ mile, respectively, from its northwest end.

Wolf Rock, 13½ miles, 5° true (NNW ¼ W mag.) from the highest summit of Forrester Island, is small in extent, 30 feet high, and bare of vegetation; it is surrounded by foul ground to a distance of over ⅛ mile.

MEARES PASSAGE

is at the northwest end of Dall Island, between it and Suemez Island, and affords passage from the sea to Tlevak Narrows and the eastern part of Ulloa Channel. The approach to Meares Passage from westward is foul in places for 2 miles from the Suemez Island shore.

Divers Islands, off the eastern shore of the passage, are prominent when approaching from seaward. The westerly island is 260 feet high and wooded. The easterly island is 115 feet high, and has a lone tree on its summit. The passage eastward of the islands is obstructed by kelp and the bottom is broken and foul.

Divers Rocks, two in number and bare at half tide, lie nearly ¼ mile west-southwest of the southwest point of the islands. A kelp patch extends 300 yards outside of them.

Eastward of Divers Islands is a bay 2½ miles long, ⅜ to ¾ mile wide, and clear except for a kelp-marked rock with 5 feet over it, which lies 650 yards from the north shore nearly midway of the length of the bay. Small craft can find excellent anchorage in an arm of the bay northeastward of the rock; the entrance is narrow, but has a least depth of 25 feet. Pass either side of the rock in entering.

Bobs Bay, the entrance to which lies northward of Divers Islands, is an irregularly shaped bay extending 3 miles in a northeasterly direction. The entrance is obstructed by a chain of reefs and islands, the largest one having an elevation of 350 feet. The bay is divided into three arms, the middle one of which is foul and not navigable except by boats. The easternmost arm affords good anchorage for moderate sized craft in 6 to 10 fathoms, soft bottom. Enter Bobs Bay ¼ mile or more south of the largest outer island and follow the east side of the island at a distance of about 250 yards. Pass in midchannel south of the high island off the entrance to the southeast arm.

Millar Rocks is a clump of numerous bare rocks, with a greatest height of 25 feet, which lie about 1 mile northwestward of Divers Islands. A rock, which covers at one-quarter flood, lies 300 yards southeastward of the highest point. Between westward and north-northwestward of the rocks the passage is foul to the main shore, although there are deep passages across it: in heavy weather the whole area appears to be covered with breakers.

In the northern part of Meares Passage, about on a line from **Eagle Point** to the summit of **Ridge Island,** and at distances from Eagle Point of ⅝ mile, 1 mile, and 1½ miles, there are several rocky, kelp-marked patches with deep water between, all of which should be avoided.

DIRECTIONS, MEARES PASSAGE.

Pass at least ¾ mile west of Divers Islands, ⅜ mile east of Millar Rocks, and ¼ mile west of Eagle Point. Then, if going to Ulloa Channel, keep westward of a line from Eagle Point to the summit of

Ridge Island until nearing the island. If bound to Tlevak Narrows, round Eagle Point ⅛ mile off and head for Bush Islets.

BUCARELI BAY

is a large arm of the sea making northward and northeastward about 22 miles from between Cape Felix and Cape Bartolome, with a width of 2 to 5 miles.

Cape Felix, on the east side of the entrance to Bucareli Bay at the south end of Suemez Island, is 2,400 feet high, bold and wooded, with several prominent bare cliffs well up the mountain side. The depths off the cape are regular and comparatively good.

Cape Bartolome, at the southeast end of Baker Island and on the west side of the entrance to Bucareli Bay, has several storm-swept rocky islets, some of them partly wooded, lying off the main shore. The cape rises quite abruptly to an elevation of 1,000 feet, and then gradually to about 1,750 feet. Numerous rocks and kelp patches lie near the cape, and the outermost wooded islet should be given a berth of ½ mile or more in rounding it.

Port San Antonio is on the west side of Bucareli Bay, 6½ miles inside Cape Bartolome. The mid-channel is clear, but a rocky shoal lies 650 yards offshore southwestward of **Point San Roque**, the north point at the entrance. Anchorage exposed to easterly winds can be had in 14 to 20 fathoms near its head and also in the wider part nearer the entrance in deeper water. Small craft can find shelter in the north arm in 5 to 7 fathoms and in the south arm in about 10 fathoms.

Port Asumcion, on the west side of Bucareli Bay, 9 miles inside of Cape Bartolome, offers protected anchorage in 17 to 21 fathoms near its head. The mid-channel is clear, but there is broken ground, which should be avoided, 300 yards off the north shore just outside the narrow part of its entrance.

Port Santa Cruz, on the eastern side of Bucareli Bay, 5 miles northwestward of Cape Felix, is about 2 miles in length and affords very good anchorage in 13 to 15 fathoms near its head. There is a kelp-marked shoal 300 yards in extent, with 9 feet over it, lying about midway between **Point Rosary** and **Point San Jose**, the two points at the entrance. Another rock, which bares and is surrounded by kelp, lies ¾ mile inside of Point Rosary and 250 yards off an islet near the south shore. Otherwise, Port Santa Cruz is clear except near the shores.

In entering round Point Rosary or Point San Jose at a distance of ⅛ to ¼ mile and head for the point on the north side of the bay about 1 mile inside the entrance. Round this point at a distance of 200 yards or more and select anchorage at the head of the bay as desired.

Point Arboleda is a low point, 2¼ miles northwestward of the entrance to Port Santa Cruz. Several outlying islets and rocks make it necessary to give the cape a berth of ½ mile in rounding it.

Port Dolores is on the easterly side of Bucareli Bay, 2 miles northeastward of Point Arboleda. It has generally broken bottom, with a sunken reef, 300 yards in extent, in its center about ⅜ mile inside the entrance. Its use is not recommended for any except small craft, and they can find anchorage in about 12 fathoms ⅜ mile from the head. The anchorage is exposed to westerly winds.

Cabras Islands are a small wooded group, with a greatest height of 180 feet, lying 1½ miles northward of Port Dolores. A reef, bare 5 feet at low water and marked by kelp, lies nearly ½ mile south-southwestward from the group.

St. Ignace Island, on the north side of Bucareli Bay 11 miles inside the entrance, is 1,500 feet high, bold, and wooded. The shores are fairly steep-to. The passage between Baker Island and St. Ignace Island is foul.

Port Real Marina is a passage on the north side of **St. Ignace, Santa Rita,** and **Baker Islands,** which affords a connection from the middle part of Bucareli Bay to Sea Otter Harbor. It is about 5 miles long and 1 mile wide and has very irregular bottom. The northeastern entrance is largely obstructed by a ledge ⅝ mile long in a northwest and southeast direction, on which are several rocky heads, the two highest of which show 8 feet at high water. Between the ends of this ledge and the shore on either side there are deep channels, neither of which has been examined by means of a wire drag, but the better one appears to be southeastward of the reef, passing 200 to 400 yards off the north end of St. Ignace Island.

Sup Islet is a prominent wooded islet, 120 feet high, in the middle of Port Real Marina, 1½ miles westward of the north end of St. Ignace Island. The depths are good on all sides of the islet up to within 150 yards of it; pass it at a distance of about 300 yards on either side; if passing southward, favor the north side of the bay beyond it in order to avoid a pinnacle rock, bare 4 feet at low tide, which lies ½ mile south-southwest of Sup Islet.

Pigeon Island lies at the southwestern end of Port Real Marina, and partially separates it from Sea Otter Harbor. It is ½ mile long, 230 feet high, and wooded. Between it and the shores the bottom is broken and irregular.

The channel which leads southward of Pigeon Island appears to be the better one, passing between two small islets, the southwest one of which lies about in mid-channel; favor the northeast islet in passing through the channel. When well clear of the islets, continue mid-channel courses in Sea Otter Harbor.

Portillo Channel, connecting Bucareli Bay at its northwest side with the Gulf of Esquibel, is 6 miles long and 1 mile wide, except at the ends, where it is wider. The eastern part is considerably blocked by kelp and scattered boulders, some of which show only at low water, and the bottom is generally broken and irregular; the western part is comparatively clear. There are several islands in the channel. **Clam Island,** 1½ miles from the eastern end, is 100 feet high and wooded. The channel northeastward of it is shoal. **Til Islet,** near the southerly shore, 1 mile west-northwestward of Clam Island, is 90 feet high, wooded, and conspicuous. **Snail Point,** on the north shore, is 80 feet high, wooded and conspicuous. The tides are said to meet off Clam Island.

Directions, Portillo Channel.—This channel is not recommended except for small craft, and then local knowledge is desirable. The southern part of the Gulf of Esquibel, with which this channel connects, has not been surveyed and little is known regarding it.

Entering from Bucareli Bay, pass ⅜ mile northeastward of the small islet lying 1 mile northeastward of the north end of St. Ignace Island, and steer 335° true (NW ⅞ W mag.), heading for the passage

between the southern shore and Til Islet; Til Islet lies 240 yards off the southerly shore and 1 mile west-northwestward of Clam Island. This course leads over very broken, kelp-marked bottom, with least depths of about 10 feet, and there are less depths on either side. Pass 400 yards southwestward of Clam Island and steer 354° true (NW ¾ N mag.) to a mid-channel position between Til Islet and the northern shore. From this position follow the mid-channel, passing from the western entrance midway between the islets and the southern shore.

San Juan Bautista Island, in the eastern part of Bucareli Bay, is 4 miles long in a north and south direction, densely wooded, and has two prominent summits each about 2,000 feet high. The shore is bold-to. **San Juanito Islet** is wooded and lies 200 yards eastward of San Juan Bautista.

Port Caldera, on the southeast side of Bucareli Bay at its head, is 1 mile long and affords good anchorage for small craft.

Trocadero Bay, locally known as **Big Harbor**, extends about 9 miles eastward from the head of Bucareli Bay with a greatest width of 3 miles. In the entrance is a group of islands of which the largest is **Madre de Dios**, 1½ miles long, 550 feet high, and wooded. The islands are bold-to with a few outlying rocks, and the passages between them are mostly of good depth. Near the head of Trocadero Bay, islands and rocks are numerous and the channel becomes more difficult. There is a copper mine on the north side of the bay, 3 miles from its head. From the head of the bay there is an easy portage to Twelve-mile Arm, Kasaan Bay, on the east side of Prince of Wales Island. In entering Trocadero Bay chart 8155 is the guide.

Port St. Nicholas extends 3 miles northeastward from the head of Trocadero Bay, and has good depths. The entrance is nearly blocked by **Coronados Islands**, but there is a good passage close southeastward of them. Northwest of Port St. Nicholas is a hill, 2,940 feet high and of a bright green color in summer, which shows conspicuously for a considerable distance southward and westward.

APPROACHES TO SUMNER STRAIT.

Iphigenia Bay lies between Noyes Island on the southeast and Coronation Island on the northwest, and is the approach from sea to Davidson Inlet and Sumner Strait. On its northeast side between Noyes Island and Cape Lynch are numerous islands, rocks, and reefs. **Timbered Islet**, the westernmost of these, is small, 200 feet high, prominent, and wooded on top.

Description and directions, Bocas de Finas to Cape Lynch, are given on page 110.

Davidson Inlet is described on page 115.

Warren Island is 5¼ miles long, 3½ miles wide, and 2,200 feet high. A bare rock lies 1⅝ miles south of it. A rock, covered at high water and with a breaker 300 yards southwest of it, lies 1⅜ miles south-southwestward from the bare rock, and a breaker lies 1⅝ miles south-southeastward from the bare rock. A sunken rock lies ¾ mile 255° true (SW mag.) from **Point Borlase**, the western point of the island; it is marked by a breaker only during a heavy swell.

Warren Channel.—This passage leads between Warren Island and Kosciusko Island, the western point of the latter island being Cape Pole. No outlying dangers were found in the channel proper, which has depths of 19 to over 100 fathoms. Numerous islets and rocks above water extend about 3 miles in a southeasterly direction from the southwest point of Kosciusko Island; **Black Rock**, the southernmost, is 50 feet high and pointed on top.

Halibut Harbor, on the south side of Kosciusko Island eastward of its southwest point, is protected by numerous islands and affords anchorage for small vessels in about 16 fathoms. Owing to the numerous rocks and reefs outside its entrance, it is not available for strangers.

Warren Cove is on the eastern side of Warren Island, about 2 miles from its southeast point, its entrance lying 2¾ miles west-southwestward of Black Rock. The cove is ⅞ mile long, about ½ mile wide, and affords good summer anchorage. It is exposed southeastward and a heavy swell makes in during southerly gales. There are no outlying dangers in the cove or entrance, but a ledge extends nearly 300 yards southward from the north point at the entrance, and the head of the cove should not be approached closer than ¼ mile. Enter in mid-channel and anchor in the middle of the cove, in about 6 fathoms, good holding ground.

The tidal currents have a velocity of 2 to 3 knots at strength in Warren Channel.

Coronation Island.—Coronation Island is 9 miles long, 5¾ miles wide at its widest part, and mountainous, with two prominent peaks. **Pin Peak**, at the northwest end of the island, is 1,300 feet high, sharp and bare. **Needle Peak**, near the center of the island, is 1,700 feet high; as seen from northward it is the highest point of the island. It is wooded except the extreme summit.

Windy Bay, on the southwest side of Coronation Island, affords secure anchorage with good holding ground. About in the middle of the approach to the bay there is a rocky islet, between which and the shore northward is a ledge. Enter about midway between the rocky islet and the southeast shore.

Egg Harbor lies on the east side of **Nation Point**, the northwest point of Coronation Island and directly under Pin Peak. It is about 1 mile long, averages over ¼ mile wide, and is a secure anchorage, except from northerly winds. The east side of the harbor is a ridge level on top and about 300 feet high and is readily distinguished from Nation Point and Aats Point, both of which are bluff and much higher. A bare islet, with a rock covered at three-quarters flood close-to outside it, lies ¼ mile northwest of the end of the ridge and forms the eastern point at the entrance.

The dangers in approaching Egg Harbor are: A rock covered at half tide and with deep water around it, lying 1 mile north-northwestward from Aats Point, and a sunken rock, marked by a breaker at low water with a moderately heavy swell, lying about 2½ miles north-northwestward from Nation Point. On both sides at the entrance to the harbor are ledges marked by kelp, the channel between them being about 400 yards wide. A mid-channel course, 170° true (SE ½ S mag.), between the ledges carries in safely. Anchor in midharbor with Aats Point in line with the lowest part of the ridge forming the east side in 7 fathoms, muddy bottom.

Aats Bay.—At Aats Point the shore of Coronation Island turns abruptly southeastward for 3 miles, and then northeastward for 5¼ miles to Cora Point. In the bight thus formed are three coves. The **western cove** has anchorage near the head for small vessels in about 10 fathoms, muddy bottom. The **middle cove** affords anchorage for vessels of any size in 5 to 8 fathoms, muddy and sandy bottom, but there is a sunken rock marked by kelp in the middle of the entrance; the better channel is eastward of the rock. The **eastern cove** has sunken rocks and should be avoided. A small island lies 1 mile north of this cove.

The dangers in approaching Aats Bay from westward are the two rocks described under Egg Harbor. A reef marked by kelp lies ⅝ mile northeastward from Aats Point, with a rock between it and the point. This reef is dangerous at night; otherwise, being marked by kelp, no particular directions seem necessary for entering the bay to the two anchorages.

Hazy Islands are 8 miles southwestward of Coronation Island. They are four in number, one being low and detached and lying 1½ miles southeastward of the rest. The highest is the southernmost of the group of three and has an elevation of about 250 feet. All of them are bare.

Spanish Islands are a chain of wooded islands extending north-northwestward from the northeast extremity of Coronation Island in the direction of Cape Decision. There are many islets and rocks surrounding these islands, and 1½ miles west of the southern one is a group of sunken rocks marked by kelp; the least water found on this patch was 12 feet; it is marked by a breaker with a heavy swell. There is a narrow 20-fathom passage between Coronation Island and the Spanish Islands. Between **Cape Decision** and these islands is a clear passage 1 mile wide, marked by a light on the northernmost Spanish Island.

Cape Decision, the west point of entrance to Sumner Strait, is a very conspicuous promontory forming the southerly extremity of Kuiu Island.

SUMNER STRAIT

is one of the great inlets into southeastern Alaska from sea. There are properly three entrances. The main entrance from the sea, between Coronation and Warren Islands, is 5¾ miles wide. The entrance east of Warren Island, between it and Cape Pole, is 1¼ miles wide and is used by vessels bound to and from Davidson Inlet and Bucareli Bay. The entrance between Cape Decision and the Spanish Islands is 1 mile wide and is used by vessels bound to and from Chatham Strait. These entrances have been described under the preceding heading.

The usual track of vessels bound north from Clarence Strait is by way of Snow Passage or Stikine Strait to Sumner Strait, and thence to Wrangell Narrows. Vessels too large to make the passage through Wrangell Narrows with safety continue westward through Sumner Strait, round Cape Decision, and go northward through Chatham Strait or westward to sea by way of Cape Ommaney. Nearly all of Sumner Strait has been examined by means of a wire drag, and the dangers are shown on the chart.

Fairway Island, on the west side of the south end of Sumner Strait, is small, 170 feet high, and wooded. A reef, bare at various stages of the tide, extends ½ mile southeastward from Fairway Island. Near the southern end of the reef are two rocks awash at high water. A reef, well bare at low water, extends ⅜ mile north of the island. These reefs are surrounded by heavy kelp. Kelp also extends over ¼ mile east of the island.

Port McArthur (chart 8179), 4½ miles north-northwest of Cape Decision, is 1½ miles long and ¼ mile wide. It is protected at the entrance by a group of islands and reefs and affords secure anchorage in about 16 fathoms. The entrance leads northward and westward of North Island and has a clear width of 400 yards between the kelp patches. Fresh water can be obtained from small streams at the head of the harbor.

North and South Islands, at the entrance to Port McArthur, are 300 yards in diameter, low and wooded, with surrounding ledges; they lie nearly ½ mile apart north and south. Between them are half a dozen rocky islets and much kelp. The passages south of South Island and between South and North Islands are shoal and rocky and should not be attempted without local knowledge.

Two large **kelp patches** lie ⅜ to ½ mile east-northeastward of North Island. In the south patch a single sounding of 10 feet was obtained and in the north patch soundings of 18 to 30 feet, but there is probably less.

Three **kelp patches** lie on the east side of the channel and ¼ mile westward of North Island. The north patch is of considerable size, its north end lying ¼ mile west-northwest of the north end of North Island. Near the north end of the patch is a rock with 5 feet over it. The south patch is also of considerable extent and surrounds a rock awash at low water which lies near the northwest end of the kelp. The middle kelp patch lies nearly midway between the western ends of the above kelp patches. It is of small extent, and a depth of 25 feet was obtained in it, but this is probably not the least depth.

Lemon Point, on the opposite side of the entrance channel, is low, and has several bare rocks off it. On the southeast and south sides kelp extends a short distance out, and the point should be given a berth of 300 yards in rounding into the port. A rock, covered at half tide, lies ⅜ mile northeastward of the outer bare rock off Lemon Point and 600 yards northwest of the rock awash on the east side of the channel. It is surrounded by kelp and is the only serious danger on the west side of the channel.

To enter Port McArthur, pass 1 mile northeastward of North Island, and when it is in line with the lowest part of the saddle between **Mount McArthur** and Cape Decision, steer 300° true (W mag.), passing ½ mile north of North Island. When the west side of North Island is in line with the east side of South Island, steer 241° true (SSW ½ W mag.) and pass between the kelp patches. This course should head for a small hill about 250 feet high on the southwest shore of the bay. When Lemon Point is abaft the beam steer 333° true (NW by W mag.) up the middle of the harbor and anchor at discretion. There are no dangers if the shores be given a berth of over 100 yards and the head 200 yards.

Affleck Canal, the entrance to which lies westward of Point St. Albans and northwestward of Fairway Island, is 12 miles long in a

north-northwesterly direction. The depths in the canal are generally great, but there are several dangers, and vessels entering the canal should be guided by the chart and use extra caution. A small vessel can anchor in the second cove on the eastern side, 9 miles above Fairway Island. **Kell Bay** is the arm on the western side, 7 miles above Fairway Island. There are several dangerous rocks in this bay, only a few of which are marked by kelp. The only anchorage is inside the islets in the bight on the south side, and a rock with 2 feet over it lies southeast from the southern islet; the entrance is westward of the islet. The basin at the head of this bight can be reached only by small craft. A **dangerous sunken rock** lies in Affleck Canal ¾ mile southeastward of Bush Islet, on the south side at the entrance to Kell Bay. On the western side, 11½ miles above Fairway Island, is **Bear Harbor**, the middle and western arms of which afford anchorage for small vessels; the passage for entering is south of the island which nearly closes the entrance, and great care is necessary.

Point St. Albans is 7½ miles north-northeastward of Cape Decision; from southeastward it has the appearance of a ridge with a general elevation of about 1,200 feet. The point ⅞ mile northward of Point St. Albans is marked by a light. Two dangerous kelp-marked reefs make out from the point, the outer limits of which are 1¾ miles southward of the light, and 1¾ miles eastward of it, respectively; the latter is marked by a buoy. A pinnacle rock, with 19 feet over it, as verified by a wire drag, lies 1⅝ miles south-southeastward of Point St. Albans.

From Point St. Albans to Point Amelius, foul ground extends to a distance of 1½ miles off the main shore, and several islets lie southeastward of **Point Amelius**. A rock which bares and is marked by kelp lies 2⅛ miles north-northeastward of the light at Point St. Albans. A rock, with a least depth over it of 28 feet verified by a wire drag, lies 6¼ miles in about the same direction from the light, and 1¾ miles eastward of the outermost islet off Point Amelius.

The **bight** westward of Point Amelius is exposed to southeast and is of no importance as an anchorage except for temporary purposes. **Louise Cove**, on its western side near the head affords anchorage for small vessels in 7 fathoms.

Port Beauclerc is a large arm on the western side of Sumner Strait, the entrance to which lies 11 miles northward of Point St. Albans and 10 miles south-southwestward of Point Baker. Port Beauclerc has several good anchorages, but they are out of the way, and it is seldom entered, as Shakan Bay is more desirable. The navigation is not difficult with the aid of the chart. **Beauclerc Island**, small, wooded, and marked by a light on its easterly side, with a wooded islet close north of it, lies off the middle of the entrance. A reef extends 300 yards eastward from the wooded islet. The anchorages in the bight on the eastern side, 3 miles above Beauclerc Island, and at the head of the port, nearly 8 miles from Beauclerc Island, are exposed to southeast winds. There is a good anchorage in the south arm in 7 to 8 fathoms; enter by the narrow passage south of Edwards Island, and slightly favor the eastern shore of the arm to avoid a sunken rock marked by kelp, lying 1 mile southwestward of the western end of the narrow passage south of Edwards Island.

Reid Bay lies on the western side of Sumner Strait, 8 miles west-southwestward of Point Baker. It has two islets and several out-

lying rocks along its north shore, and a rock awash south of the islets and in mid-channel. Small craft may anchor in the cove on the west side of the peninsula point on the south side at the entrance to the bay in 5 to 6 fathoms, muddy bottom. There are dangers off the points at the entrance to this cove and it should be entered with caution. A kelp-marked **reef** lies in the approach to Reid Bay 1¼ miles southwestward of the south end of Sumner Island.

Strait Island lies in the middle of Sumner Strait, 3 miles westward of Point Baker. It is 1 mile in length, divided into two parts at high water, is low and wooded, and marked by a light on its southerly point. A reef, partly bare at low water, extends nearly ¾ mile south-southeastward from the light.

Keku Strait has its southern entrance between Sumner Island and Point Barrie. Small craft with local knowledge use Keku Strait at high water in passing back and forth between Sumner Strait and Frederick Sound; otherwise these waters are not navigated. The bay at the southern entrance has foul shores, and there are numerous rocks and islets near its head. **Conclusion Island** is the large island about 3 miles northwestward of Sumner Island. Westward of Conclusion Island is an unnamed **bay** about 1¼ miles wide at its entrance but narrow and foul at its head. **Seclusion Harbor** is a small inlet about 3½ miles northwest of the western end of Conclusion Island. A chain of islands lie eastward of its entrance, and a rock with 7 feet over it lies nearly in mid-channel southward of them and 1⅔ miles from the west end of Conclusion Island. **Threemile Arm** makes westward at the northwestern end of the large bay; at its entrance it is much obstructed by rocks. Local knowledge is necessary in navigating these waters.

Pole Anchorage is an anchorage for small vessels on the east side of the south end of Sumner Strait; it is a fair lee from northeast and southeast winds, but is exposed to southwest winds and swell. The south point, at the entrance, is a large mass of grassy-topped rocks, about 10 feet high, lying about ⅜ mile northwest of Cape Pole, the passage between having many bare rocks and being nearly bare at low water. The water is apparently shoal with considerable kelp for some distance northwest of the grassy-topped rocks. The north point at the entrance is a wooded islet close to shore; kelp extends some distance northwest of it, also about 100 yards southwest. A **sunken ledge**, marked by kelp, lies on the eastern side of the anchorage well inside the islet and probably 200 yards or more from shore.

Approaching Pole Anchorage, steer for the entrance on a 159° true (SE ½ E mag.) course, and slightly favor the wooded islet in passing between it and the grassy-topped rocks. Pass in mid-channel between the latter and the sunken ledge on the eastern side, and anchor in 12 to 15 fathoms, muddy bottom, midway between the ledge and Cape Pole, with the north end of Warren Island showing midway between the cape and the grassy-topped rocks.

Bluff Island is a steep wooded island about 200 feet high off the middle of the entrance to Shipley Bay; a bare islet lies close to its western side, and a reef extends ⅜ mile off the islet. A **rock**, with 3 feet over it and marked by kelp, lies 1 mile east of the south end of Bluff Island and ¾ mile from the south shore.

Shipley Bay, on the east side of Sumner Strait, is 6 miles long and 1½ miles wide, and has a good anchorage at its head, but it is seldom used, as Shakan Bay is a more desirable anchorage. A reef extends ¾ mile southeast from the north shore 1¾ miles from Bluff Island; this reef partly shows at low water, has deep water close-to, and is marked by kelp. Eastward of this reef the north shore is clear to the head of the bay. A projecting point on the south side, 4 miles from Bluff Island, has a small islet and some rocks showing kelp close north of it. On a line between the south end of Bluff Island and this point, and 1 mile from the latter, there is a reported rock, marked by kelp, ⅜ mile from the south shore. Anchorage can be had about ¼ mile from shore on the southeast side at the head in 14 fathoms, muddy bottom.

Shakan Bay.—Shakan Bay (chart 8176) has its entrance on the east side of Sumner Strait, 20 miles north-northeastward of Cape Decision and 12 miles southeastward of Point Baker. The south shore of the bay is clear, with the exception of rocks close-to, but the entire north side is foul for 1½ miles offshore, as shown on the chart. On the east side of the bay are three large islands and numerous small ones, between which are boat channels connecting with the northern part of Shakan Strait.

The Nipples, 1 mile southeast of Shakan Strait, **Mount Calder**, north of the bay and 2 miles northeast of Barrier Islands, are good landmarks for the bay, and **Station Islet**, off the south point at the entrance, is marked by a light. **Shakan Islet**, ¼ mile west of Station Islet, is a rock about 18 feet high with a few bushes and grass on top. A sunken reef, marked by heavy kelp, extends about ½ mile westward of Shakan Islet.

Shakan Strait is about 8½ miles long, in the shape of a horseshoe, lying eastward and northward of the large islands on the east side of Shakan Bay. Its entrance is narrowed to 350 yards by kelp-marked ledges on both sides, between which the depth is 8 fathoms. When inside the entrance the strait has a general width of ½ mile and midchannel depths of 20 to 30 fathoms for 3½ miles, where it widens to about ¾ mile, has depths of 6 to 13 fathoms, and is a secure anchorage.

Shakan is a post office and native village on the east side of Shakan Strait, 4 miles from its entrance. There is a store, sawmill, cannery, and wharf; the cannery wharf has about 18 feet at its end. Communication by regular mail launch is had with Wrangell and points on the west coast of Prince of Wales Island.

Calder is a marble quarry in the cove on the northeast side of Shakan Strait 2¼ miles northwestward of Shakan. A wharf for vessels is on the southeast side of the cove, and fresh water can be had at the wharf.

Dry Pass has its western entrance in Shakan Strait ⅞ mile northward of Shakan. It is about 4 miles long and connects with El Capitan Passage. The pass is narrow, foul, and in one place dry at low water, but is used by small local craft between Shakan and points on the west coast of Prince of Wales Island.

Enter Shakan Bay with Beauclerc Island light astern and Station Islet light a little on the starboard bow.

Favor the north point slightly in entering Shakan Strait. When 1¼ miles within the entrance to the strait favor the north shore

slightly; otherwise follow a mid-channel course to the anchorage off Shakan, a distance of 4 miles. Anchor about ¼ mile off the wharf in 7 to 9 fathoms, muddy bottom.

Barrier Islands, on the north side at the entrance to Shakan Bay, are two good-sized islands, with numerous rocks and islets around and between them. The western island is about 200 feet high, the eastern island about 350 feet, and both are nearly level and wooded. A reef extends ¾ mile south-southeast from the south point of the western island, and a rock, with 15 feet over it, lies ¾ mile 272° true (SW by W ½ W mag.) from that point.

Calder Rocks are a dangerous, kelp-marked reef lying well out from the eastern shore of Sumner Strait, the southeasternmost point of which is 2 miles west-northwestward of the Barrier Islands. From this southeasternmost point, which bares 3 feet at low water, the reef extends 1¼ miles in a northwesterly direction with little depths over it and with deep water close-to. There is a good passage on each side of Calder Rocks; the one eastward is generally used by small craft, while the one westward is used by larger vessels.

Hole in the Wall is a small cove on the east side of Sumner Strait 2½ miles north of Barrier Islands, the entrance of which is through a very narrow passage ½ mile long, between high bluffs, and opens into a basin 400 yards in diameter. There are two rocks in the entrance to the neck with 4 feet on them. The depths in the basin are 8 to 11 fathoms and it is a good anchorage for small craft.

Labouchere Bay (chart 8154) is ¾ mile wide at the entrance and 1½ miles long; it is studded with islets and rocks, the entrance being nearly closed by three rocks marked by kelp. The bay is not recommended as an anchorage. Two bare rocky islets about 25 feet high, the outer one called Labouchere Island, lies in the entrance.

Protection Head, a bold white bluff 150 feet high, lies 1 mile northward of Labouchere Island.

Port Protection (chart 8154) has its entrance 1 mile southward of Point Baker and 1⅛ miles northward of Protection Head. The port is 1¼ miles wide at the entrance, 2¾ miles long, and has a good anchorage near its head. At 1½ miles within the bay it contracts to less than ½ mile in width. A chain of islands divides the upper portion of the bay. There is a good anchorage on each side of these islands; the best is probably in mid-channel on the south side in about 11 fathoms, muddy bottom, abreast the passage between the two largest islands. Small vessels may anchor a little farther in in 6 to 8 fathoms. The best channel to the anchorage north of the islands is between the two outermost ones, but there is a sunken rock exactly in mid-channel with 10 feet over it. Leave this rock preferably on the port hand in passing between the islands and anchor in mid-channel northeast of the eastern one in about 9 fathoms, muddy bottom.

The shores of Port Protection are usually fringed with kelp, and the soundings, though deep, are irregular and the bottom more or less rocky. About ¾ mile southeastward of the north point at the entrance is a reef covered at half tide and marked by kelp. It is easily avoided by somewhat favoring the south shore until well inside, when a mid-channel course leads safely to the head.

A convenient anchorage for fishermen and other small craft in the vicinity of Port Protection is on the east side of the island, which forms Point Baker, about ¼ mile eastward of the point.

Helm Rock, with 14 feet over it, is on a line between the south point of Strait Island and Point Baker and ⅝ mile from the latter. There are usually heavy tide rips and swirls around it. Another rock, with 21 feet over it, lies 700 yards off the north side of Point Baker. The usual course is mid-channel between Point Baker and Strait Island.

The **cove** 1 mile east of Point Baker is a good anchorage for small vessels in 8 to 10 fathoms, muddy bottom, but is open northwest. It is ¼ mile long and 300 yards wide at the entrance. On the western side at the entrance are several bare rocks, and a little west of the entrance and 300 yards offshore is a large rock, awash at highest tides, known as **Twin Island.**

In the open **bight**, 6½ miles east-northeast of Point Baker and 4½ miles west-southwest of Red Bay entrance, vessels may find anchorage with shelter from southerly winds in 10 fathoms, sandy bottom, about ¾ mile from shore.

Red Bay.—This bay (chart 8168), in the south shore of Sumner Strait, 11 miles eastward of Point Baker and 3 miles westward of Point Colpoys, is seldom, if ever, used by vessels seeking anchorage or shelter only, as the narrow entrance is foul, with strong tidal currents, and requires local knowledge.

The entrance is through a narrow and rocky channel ½ mile long, with depths of 2¼ to 4 fathoms. The narrowest part of this channel is at its southern end, and is about 50 yards wide between Bell Island and a rock, bare at low water, just west of mid-channel. At ¾ mile southward of this point the channel leads between two grassy rocks about 2 feet high, and then westward of **Range Islet**, which is wooded. A rock, with about 5 feet over it, is reported to lie about 100 yards 0° true (NNW ¾ W mag.) from the north end of Range Islet. South of Range Islet the bay is about 2 miles long and ⅜ mile wide, with depths of 5 to 15 fathoms and no dangers.

Dead Islet, a small and wooded, lies close to Bell Island and forms the eastern point at the entrance; a reef with bare heads extends 350 yards northward of the islet. **Bell** and **Danger Islands,** low and wooded, form the east and west sides of the narrow entrance, and are separated from the main shores by shallow passages, useless except for small boats wishing to avoid the strong currents of the main entrance.

Small vessels may anchor at the entrance to Red Bay in the bight west of Dead Islet, if not wishing to enter or if waiting for the tide to enter the bay. Anchor in the middle, westward of Dead Islet, in 7 to 10 fathoms, muddy bottom. Larger vessels should anchor with more swinging room, in 18 to 20 fathoms.

Tidal currents in the narrow entrance to the bay have a velocity of 3 to 5 knots, with a very short interval of slack at the time of high and low water.

Directions, Red Bay.—About 12 feet is the greatest draft that can be safely carried in at low water. The safest time to enter is at, or shortly before, high water slack. All dangers are marked by kelp, but it is run under during the strength of the current.

Enter between the bare rock at the north end of Danger Island and the south end of Dead Islet, favoring the latter, and then favor the western or Danger Island shore, until halfway through the passage, when the eastern or Bell Island shore should be favored to avoid the rock lying close to the southeast point of Danger Island. Bring the eastern grassy rock in line with the west side of Range Islet and steer that range until near the rock, and then pass midway between the two grassy rocks and westward of Range Islet. Then follow a mid-channel course up the bay and select anchorage at pleasure.

Two miles **eastward of Red Bay** is an open bight, sheltered from southerly winds, which affords anchorage for vessels of any size in 10 to 15 fathoms, muddy bottom, about ½ mile offshore. The shore of the bight eastward to Point Colpoys is rocky and should not be approached closely.

Clarence Strait is described on page 66.

Totem Bay is a large indentation on the northwestern shore of Sumner Strait midway between Point Barrie and Mitchell Point. A reef extends 1¼ miles eastward from the west point at the entrance, and a shoal extends ¼ mile off the eastern point at the entrance. The bay has depths of 7 to 8 fathoms, but is exposed to southeast winds and is of no importance as an anchorage except for temporary purposes. Shoals extend over ¼ mile from the shores of the bay. **Shingle Island**, low and wooded, lies about 1½ miles southward of the entrance; a reef, much of which shows at low water, extends nearly 1 mile southeastward from the island, and a rock, with 10 feet over it, unmarked by kelp, lies 1⅛ miles from the island in the same direction. A series of shoals, with 5 to 6 fathoms over them, extends ¾ mile eastward from the 10-foot rock.

The Eye Opener is a ledge near the middle of Sumner Strait, 11¾ miles northeastward of Point Baker. It is marked by a light. A rock, with 8 feet over it and not marked by kelp, lies ⅜ mile southward of The Eye Opener.

McArthur Reef lies 3¼ miles northeastward of The Eye Opener and 3½ miles north-northwestward of Point Colpoys. This reef has 2½ fathoms over it and is marked by a buoy.

Douglas Bay is a bight open southward lying 4 miles northwestward of The Eye Opener and eastward of Moss Island; it has depths of 5 to 6 fathoms, but has no importance as an anchorage.

Mitchell Point is low, level, and rocky. A broad tapering reef, showing considerable kelp, extends 2¼ miles east-southeastward from the point. The extreme outer end of the reef is bare at low water; at high water it is usually marked by tide rips.

Level Island lies 2½ miles northeastward of Mitchell Point; a high-water passage divides the island into two parts. South of the western part is a small islet surrounded by rocks, and the entire island is surrounded by a shelving ledge and by kelp extending out nearly ½ mile. A pinnacle rock, with 18 feet over it, as verified by a wire drag, lies ⅝ mile eastward of Level Island in the direction of Vichnefski Rock light.

White Rock, 1 mile north-northeastward of the east end of Level Island, is 15 feet high, and will be readily recognized by its white appearance and detached position. A rock, bare at half tide and surrounded by kelp, lies ¼ mile southeast of White Rock.

Kah Sheets Bay, northwest of Level Island, is foul.

Duncan Canal has its entrance 3 miles west of the entrance to Wrangell Narrows. It is about 20 miles long and ¾ to 1½ miles wide. A low marshy valley, which is sometimes used as a portage, extends from its head to Portage Bay. The soundings in the canal are mostly less than 20 fathoms and somewhat irregular. The long bay, extending into the west shore west-southwest of Beecher Pass, is shoal and its entrance is rather foul. **Beecher Pass**, 4 miles within the entrance to Duncan Canal, connects the canal with Wrangell Narrows; it is filled with islets and reefs showing much kelp. With local knowledge tugs with tows sometimes use Beecher Pass at high water. **Grief Islet**, on the northeast side of Duncan Canal northwest of Beecher Pass, must not be approached closely, as foul ground is found close inshore and southeast of it.

The approach to Duncan Canal has been examined by means of a wire drag as far as the island in the entrance and the dangers are shown on the chart.

A rock which bares 14 feet lies nearly on a line joining White Rock and the west point at the entrance to Wrangell Narrows and nearly 1 mile from the point.

Wrangell Narrows is described on page 134.

Vichnefski Rock lies on the southeast side of Sumner Strait ¾ mile northwest of Point St. John, Zarembo Island. It is a long bare rock, awash at extreme high water, and is marked by a light. Eastward of Vichnefski Rock are several ledges, partly bare at low water, and the passage between the rock and **Point St. John** should not be attempted except by small craft with local knowledge.

St. John Harbor (chart 8154), on the northwest side of Zarembo Island northeastward of Vichnefski Rock light, is sheltered except from northwest. **Northerly** and **Southerly Islands**, in the outer part of the harbor, are about 150 feet high to the tops of the trees. Two large rocks lie close to the northwest side of Northerly Island; and rocks, bare at low water and marked by kelp, lie just outside of them. Vessels should enter midway between Northerly Island and Low Point. Anchorage in about 14 fathoms, muddy bottom, can be had just before the north ends of Northerly and Southerly Islands come in range; this will be midway between the middle of Southerly Island and the first bight in the opposite shore of Zarembo Island. Anchorage in 7 fathoms can be had farther in, but the currents are strong. Small craft can enter St. John Harbor southward of Northerly and Southerly Islands, taking care to avoid a rock, awash at half tide, which lies 200 yards southwestward of the south point of Northerly Island, and a similar rock which lies 80 yards southward of Southerly Island.

Baht Harbor, on the northwest side of Zarembo Island 3 miles southwestward of Point Craig, is a broad, open bight, affording anchorage in southeast winds. The anchorage is in the middle of the bight, in 12 to 15 fathoms, about ¼ mile offshore. At high water the navigator should not seek less than 15 fathoms.

Little Baht Harbor, 1 mile southwestward of **Point Craig**, affords anchorage for small craft in 7 fathoms, soft bottom, behind a wooded islet and off the mouth of a small creek. There is considerable current at the anchorage, and its use is recommended only in case of emergency.

Woodpecker Cove is a small indentation on the northwest side of Sumner Strait, close westward of **Point Howe**. It affords anchorage for small craft with protection from Stikine winds.

Blind Slough, on the northwest side of Sumner Strait 3 miles west-northwest of Vank Island, is ¾ mile wide and 3 miles long, and has a wooded island 200 feet high in its entrance. It is exposed to southeast, and is too shallow to be of use as an anchorage except for small craft with local knowledge.

A rock, with 12 feet over it, lies about midway between the entrance to Blind Slough and the south end of **Sokolof Island**, and 1⅛ miles west-northwest of Two-Tree Islet.

Vank Island, 1¾ miles north-northeast of the Zarembo Island shore, is marked by a light at its southerly end. Passage can be made on either side of the island, but that southward is to be preferred.

Dry Strait, bare at low water, crosses the flats between Sumner Strait and the head of Frederick Sound. At highest tides 6 feet can be carried through Dry Strait by keeping westward of **Wilson Islands** and following close around Mitkof Island, but the strait is practically useless except for small craft. The tidal currents meet in the vicinity of Blaquiere Point; the flood current sweeps over the flats with considerable velocity.

Stikine River debouches by two mouths; one, the north channel, following the mainland westward, enters the head of Frederick Sound; the other follows the mainland southward, and forms the only navigable entrance to the river, the north channel being navigable only by small craft at high water. The southern entrance has a least depth of about 2 feet at low water with a rise of 18 feet at spring tides. The channel is ¼ to ½ mile wide, and changes with every freshet. The river freezes in winter, and with the spring freshets the current runs with great velocity. Small river vessels from Wrangell navigate the river in summer and early fall months as far as Glenora, a distance of 126 miles; canoes can ascend another 12 miles to the mouth of Telegraph Creek.

Stikine Strait is described on page 78, Zimovia Strait on page 93, Wrangell Harbor on page 78, Highfield Anchorage on page 79, and Eastern Passage on page 93.

Currents—Sumner Strait.—The currents set directly in and out of the strait during flood and ebb, except along the shores, where it is either slack or there is a small countercurrent. The flood from its entrance sets through Summer Strait toward Zarembo Island, and there divides, a branch passing through Snow and Kashevarof Passages, meeting the flood current from Clarence Strait in the vicinity of Key Reef. (See "Currents, Snow Passage," p. 77.) The second branch sets northward of Zarembo Island and eastward until it at last meets and is overcome by the current from the Stikine River. The ebb makes out from the vicinity of Wrangell through Sumner Strait, also through Stikine Strait and Chichagof Pass to Clarence Strait, its velocity being augmented by the current from Stikine River. (See also "Currents, Eastern Passage," p. 94.) The edge of the current from the Stikine River is well defined by its muddy-white appearance, and near the end of the ebb tide is sometimes noticed westward of Vank Island and well southward in Chichagof Pass and Stikine Strait.

At the entrance to Summer Strait, the estimated velocities between Coronation and Warren Islands are 1½ knots on the flood and 2 knots on the ebb, and between Cape Decision and Spanish Islands 2 and 2½ knots, respectively. In the broad part of the strait, from its entrance until nearly up with Point Baker, the estimated velocities are 2 knots on the flood and 3 on the ebb. Between Point Baker and Strait Island the velocities are from 3 to 6 knots, the irregularity of the bottom there producing heavy swirls and surface disturbances. From this point to Zarembo Island the estimated velocities are 3 knots on the flood and 4 knots on the ebb, and thence until eastward of Vank Island 2 knots and 3 knots, respectively. Near Wrangell Harbor the ebb current has a velocity of 2 to 4 knots and sets southward; the flood has much less velocity, probably seldom exceeding 1 knot, and its direction depends upon the stage of the tide and the stage of the Stikine River.

The flood enters Duncan Canal and runs in the direction of its axis, except at the west entrance of Beecher Pass, through which it passes into Wrangell Narrows, causing a cross current in this immediate vicinity. The ebb flows in an opposite direction, and the same cross current, with a westerly set, is found at Beecher Pass.

Directions for vessels bound to Wrangell and thence through Wrangell Narrows are given in the table of courses on page 21. Directions for vessels bound to Juneau by way of Snow Passage, Sumner Strait, Chatham Strait, and Frederick Sound, are given in the table of courses on page 24.

WRANGELL NARROWS

(chart 8170) extends in a general north-northwesterly direction for 21 miles from near the northeast end of Sumner Strait to the eastern part of Frederick Sound. The channel is narrow and intricate in places, between dangerous ledges and flats, and the tidal currents are strong. It is marked by an extensive system of lights, beacons, and buoys which, with the aid of the chart, render the navigation of the narrows fairly easy for small craft, even without local knowledge. Vessels of more than about 10 feet draft, however, are advised not to attempt to go through without a pilot. A local pilot can sometimes be obtained at Ketchikan, Wrangell, or Petersburg. It is safest to enter either end with a flood tide.

The least depth in the channel is about 11 feet, on the middle ground northeast of Bayou Point. A depth of 2¼ fathoms is found at other places in the channel. The tide tables should be consulted for the height of the tide at the time of going through, and a stage of tide selected when the depth in the channel is sufficient to insure a safe passage. Once or twice each year exceptionally low tides occur, at which times the water may fall as much as 1 foot below the plane of reference of chart 8170.

Tide staffs have been established at either end of Wrangell Narrows to show the height of water in the narrows. The northerly one is on the end of the wharf at Petersburg, and the southerly one opposite and northward of Point Lockwood, as shown on chart 8170. The reading on the staff, added to the charted depths, will give the depths at the time.

The tides enter Wrangell Narrows from both ends, and meet a little north of Green Point; they generally stand at high and low water about 20 minutes and run each way 6 hours. Except near Finger Point the **tidal currents** have considerable velocity throughout the strait. From the southern entrance of Wrangell Narrows to No Thorofare Point the velocities are 1 to 4 knots; at Spike Rock, 3 to 5 knots; Spike Rock to Spruce Point, 4 to 6 knots; Anchor Point to Green Rocks, and Green Point to Blunt Point, 1 to 3 knots; Blunt Point to Turn Point, 2 to 4 knots. In the channel north of Petersburg, the current turns from southwest to northeast 35 minutes after the time of high water at Sitka, and from northeast to southwest 50 minutes after the time of low water. The velocity of the northeast-going stream at strength is 4.1 knots, and of the opposite stream 4.7 knots.

The aids to navigation are placed for vessels going north; they are generally well preserved, but occasionally some of them are displaced or carried away by rafts, or drift in the strong currents, and this should be kept in mind, especially in the narrower parts of the channel. They are inspected about every five days or oftener, and if found out of position are replaced as soon as practicable.

Vessels too large to make the passage through Wrangell Narrows safely continue westward through Sumner Strait, round Cape Decision, and go northward through Chatham Strait, or westward to sea by way of Cape Ommaney. Smaller vessels regularly using Wrangell Narrows sometimes use the longer passage to their advantage when not favored by suitable conditions of tide or daylight in the Narrows.

Anchorage, with protection from northerly and northeasterly winds, can be had near the western shore of the southern end of the Narrows westward of Midway Rock, in 6 to 12 fathoms, sticky bottom.

Midway Rock lies 1¼ miles from the southern entrance to the narrows and 400 yards from the eastern shore; it is low and marked by a light.

Point Lockwood beacon is on a ledge close to the western shore nearly ½ mile above **Point Lockwood.**

A dangerous flat, bare at low water, extends 300 yards off the mouth of a stream on the eastern shore opposite Point Lockwood beacon.

Point Lockwood Rock, with 1½ feet over it, lies 300 yards northwestward of the beacon and 200 yards from shore and is marked on its northeasterly side by a float light. A sunken rock, with 13½ feet over it and no kelp, lies nearly midway between the rock and Battery Islets.

The channel westward of **Battery Islets** has a clear width of 200 yards, with rocks on both sides. The channel eastward of the islets is unsafe except for small craft.

Spike Rock is a ledge about 200 yards long and awash at extreme low water, lying near mid-channel. It is covered by heavy kelp which tows under during the strength of the current. It is marked by a light. The passage east of Spike Rock is generally used and carries the best water, but the eastern shore abreast the rock must be given a berth of over 100 yards.

Above Spike Rock the chart and the aids are the best guides. Pass about 100 yards westward of **North Ledge** beacon, to insure clearing

the point of the ledge, and about the same distance southward of **Colorado Reef** buoy, which lies 300 yards southwestward of **Anchor Point**. Pass well eastward of the light ¼ mile westward of **Blind Point**, and from there exercise care until past **Rock Point**. For 2 miles above Rock Point, to the light off **Green Point**, the channel favors the westerly shore and is well marked.

From the light off Green Point the channel widens to nearly the whole width of the narrows, and the water deepens to 15 to 20 fathoms.

Tonka is a wharf and unused cannery on the west side of the narrows 1½ miles above Green Point.

Scow Bay, 3 miles above Tonka, is the site of a fish products plant.

At **Blunt Point** the channel narrows and there are bowlder patches, marked by kelp, on each side. Extending across the channel from Turn Point to Bayou Point, near the north end of the narrows, is a changeable bar on which the best depth, 11 feet, is marked by buoys. In crossing the bar with a long vessel, when the current is running with any appreciable strength, considerable care is required in making the turns to avoid being set upon the shoals near the buoys.

Petersburg is a post office, cannery, and small fishing village on the east side of Wrangell Narrows, 1 mile inside the north entrance. Water can be obtained on the wharves, and provisions and fishermen's supplies can be had at the stores. Extensive repairs to hulls or machinery of small craft can be made. Petersburg has radio communication with Wrangell. The depth at the wharves is about 12 feet. The tidal current is reported to set northward almost invariably along the face of the wharves.

The northerly entrance to Wrangell Narrows has a width of only 100 yards, between the 12-foot curves, at a point about 450 yards east-northeastward of the light marking Prolewy Rocks, and is marked on each side by a buoy. As the tidal currents set fair with the channel no great difficulty is experienced in passing through. **Mitkof Island light** marks the eastern point at the northern entrance.

For courses, see table of courses on page 22.

FREDERICK SOUND

(charts 8200, 8250) has its entrance from Chatham Strait between Point Kingsmill and Point Gardner, and extends northeastward to The Brothers and Cape Fanshaw, at the entrance to Stephens Passage, and eastward to **Dry Strait**, a high-water boat passage connecting it with the eastern end of Sumner Strait. The sound is open and clear of obstructions, and there are few dangers to navigation away from the shores. The shores and islands of the sound are all high.

Ideal Cove has its entrance on the south side of Frederick Sound, 14 miles east of Wrangell Narrows and 1¼ miles southeastward of Coney Island. It is a good anchorage for small vessels in 7 fathoms. The entrance is narrow but clear, the only danger being two well-defined rocks awash close to the east point at the entrance, and a vessel in entering should stand in close to the small islet at the west side of the entrance. **Coney Island** is steep-to; the edge of Stikine River flat lies ½ mile northward of it, and reefs extend 600 yards northwestward from the point ¾ mile south-southeastward of the island.

Le Conte Bay, on the north side of the head of Frederick Sound, is usually inaccessible for vessels on account of the floating ice, and there is no anchorage because of the great depth. The entrance is narrow between the north end of the Stikine River flats and the shore and has a bar about 1 mile long with 2½ fathoms.

Wrangell Narrows is described on page 134.

From Wrangell Narrows to Cape Strait the southwesterly shore of Frederick Sound is bold and can be safely approached as close as ½ mile. A ledge, which bares about 8 feet, lies ¼ mile from the head of the bight south-southwest of Sukoi Islets. About 2 miles southeastward of Cape Strait there is a small valley and bight off which a reef and wooded islet extend ¼ mile.

Sukoi Islets are two wooded islands, with a smaller one between, lying 3¾ miles north-northwestward from the entrance to Wrangell Narrows and about 1 mile off the southwesterly shore of Frederick Sound. The westerly point is marked by a light. The usual channel is southwestward of the islets.

Beacon Point, 3 miles northwestward of Sukoi Islets, is marked by a beacon.

Cape Strait is marked by a light shown from a skeleton steel tower on a low rock close to shore.

Thomas Bay.—This bay (chart 8210) is the large estuary on the north side of Frederick Sound between Wood Point and Point Vandeput, 10 miles westward of Wrangell Narrows and 22 miles eastward of Cape Fanshaw. The bay can not be considered a harbor of refuge in thick or bad weather on account of the difficulty and danger of passing the entrance, and when once in the bay a suitable anchorage is difficult to find on account of the great depth of water.

The entrance is obstructed by a reef and bar which extends in a curve between Point Vandeput and Wood Point. The reefs extending from the points are bare at low water, and between them there is a channel about 1 mile wide over a bar with depths of 4½ to 8 fathoms. On the outer edge of the bar, about the middle of the channel, is a shoal with 15 feet over it.

Thomas Bay, from the bar to Baird Glacier, at its head, is about 10 miles long. On the southeastern side is an arm extending about 3 miles eastward to the moraine of the Patterson Glacier. These glaciers do not discharge ice into the bay.

Wood Point, on the east side at the entrance to Thomas Bay, is low and wooded. A reef, largely bare at low water and marked by kelp, extends nearly ½ mile west and ⅝ mile south-southwest from Wood Point. There is a channel ⅜ mile wide with depths of 5 to 8 fathoms between the reef and the shoal on the bar.

Point Vandeput, on the west side at the entrance, is low and wooded; at the end of the wooded portion of the point is a detached clump of trees. A reef or spit, the inner part nearly always bare, extends 1 mile southeastward from Point Vandeput. Its end has a depth of 2½ fathoms, but there is a possibility of less. From ⅜ to 1 mile northeast of the point there is a large reef, parts of which nearly always show. These reefs are marked by kelp at slack water.

A shoal spot lies on the bar midway between the reefs extending from Wood Point and Point Vandeput. It has a depth of 15 feet, but there may be less, as the bottom has bowlders. It is marked by kelp at slack water.

The Tidal Currents have a maximum velocity of about 3 knots over the bar at the entrance to Thomas Bay, and swirls occur at times from the shoal spot in the middle to Point Vandeput. In the channel east of the shoal spot the swirls are little felt.

Spurt Point, in Thomas Bay, 3¾ miles northeastward of Point Vandeput, is steep and wooded. A large ledge, portions of which show at all times, lies ⅝ mile southwest of Spurt Point; it is not in the way and is easily avoided.

Range.—On the northeast side of Thomas Bay are several landslides. At the time of the survey the northwest landslide in line with Spurt Point formed a range bearing 65° true (NE by N mag.) for crossing the bar, leading in mid-channel with a least depth of about 4½ fathoms between the shoal spot in the middle and the end of the reef extending from Point Vandeput. But the landslide is rather large and is subject to change by growing vegetation and additional slides, and in consequence the range may not lead in the best water in the channel west of the shoal spot. At low water vessels with a greater draft than 12 feet should exercise caution when entering on the range.

Bock Bight, lying 1¾ miles northeastward of Wood Point, is a narrow, deep bight, the entrance to which is bare nearly 2 hours before low water, forming a dam with deep water inside; except at slack water, the water rushes over this dam with great force.

Ruth Island is the large island forming the southwest side of the southeast arm of the bay; close to its northwest end is a small islet and some low-water rocks. Rocks and shoals close the passage on the southwest side of Ruth Island. On the northeast side of this southeast arm is a small islet, called Spray Island; the best anchorage in Thomas Bay is in 17 fathoms, close inshore, between Spray Island and the large waterfall on the mainland.

Scenery Cove, in the northern part of Thomas Bay, does not afford anchorage except for small craft.

Directions, Thomas Bay.—Vessels of less than 12 feet draft can enter on the range described above. Vessels of a greater draft than 12 feet should bring Wood Point to bear about 59° true (NNE ½ E mag.) and Point Vandeput 341° true (NW ½ W mag.), and from this position steer 25° true (N ½ W mag.), passing ⅝ mile westward of Wood Point. When Point Vandeput is abeam steer 70° true (NE ½ N mag.) and leave Spur Point ¼ mile on the port hand and the islet close to the northwest end of Ruth Island ¼ mile on the starboard hand.

Farragut Bay.—This bay (chart 8210) is the large indentation on the north side of Frederick Sound between Grand Point and Bay Point, 20 miles westward of the north entrance to Wrangell Narrows, and 12 miles eastward of Cape Fanshaw. The numerous reefs and rocks and the deep water render it of no particular use as an anchorage, though it is readily entered in the daytime. The bay is 3 miles wide at its entrance and 2½ miles long. There are two large arms to Farragut Bay. The western arm is the smaller and is practically useless on account of a rock in the middle of the entrance, which uncovers only at lowest tides. Tidal currents have little velocity in the bay.

Read Island, about 1¾ miles long and ½ mile wide, lies on the eastern side of Farragut Bay. The best passage to Francis Anchor-

age is westward of Read Island, and between the north end of the island and Flock Rock.

A reef extends 350 yards off the southern end of Read Island, terminating in a bare rock. A rock awash at low water lies about 400 yards southwestward from the bare rock.

Ledges marked by kelp extend ¼ mile from the southwest side of the northwest half of Read Island.

At 1⅛ miles westward of the northwest end of Read Island and ¼ mile from the north shore of the bay is a large rock several feet high, with a rock awash at half tide about 100 yards south of it; a shoal with 14 to 17 feet over it, extends ½ mile south-southeast from the bare rock.

Flock Rock is a small rocky islet in the middle of the passage northwestward of Read Island. A ledge awash at low water lies 300 yards southwestward of Flock Rock.

There is a narrow passage with a depth of 4½ fathoms between Read Island and Grand Point which may be used by small craft. To enter, keep Grand Point aboard at a distance of about ¼ mile, steer for the eastern end of Read Island on a 36° true (N ½ E mag.) course, and keep in mid-channel in the narrow part of the passage.

A temporary fair-weather anchorage can be made west of the south end of Read Island in about 16 fathoms, muddy bottom, with Grand Point in line with the bare rock lying 350 yards south of Read Island, and about ¾ mile from the rock.

A small vessel can make a temporary fair-weather anchorage between Grand Point and the south end of Read Island in 5 to 6 fathoms, hard bottom.

Francis Anchorage, the only sheltered anchorage in Farragut Bay, is in the eastern arm. The anchorage is in 13 fathoms off a bight in the end of the headland that forms the eastern point at the entrance; the northern half of this arm is 1 mile wide and dry at low water. A short reef extends westward from the point at Francis Anchorage, but the point can be approached as close as ¼ mile with safety.

Entering Farragut Bay, the chart is the guide.

From Farragut Bay to Cape Fanshaw the shore should not be approached closer than ½ mile.

Cape Fanshaw, at the junction of Stephens Passage and Frederick Sound, is a long, low, wooded point terminating in a moderately long sand spit, with a large boulder at the extreme end, and deep water as close as ¼ mile. The cape is marked by a light near its extremity.

Portage Bay (chart 8210), on the south side of Frederick Sound 7 miles westward of Cape Strait, is a secure anchorage but its entrance is narrow. The tidal currents in the entrance have considerable velocity at spring tides. Ice forms in the bay with extreme cold weather. **Portage Islets**, two in number, lie in Frederick Sound ¾ mile westward of the entrance and ⅜ mile from shore.

The entrance is ¼ mile wide between **East** and **West Points**, and just northward of them the channel is contracted by shoals to 150 yards, with depths of 3 to 4 fathoms. Shoals make out from the shores of the bay and also from the head down to ¾ mile northwestward of **Stop Island.**

The best time to enter is at high-water slack. To enter, steer 191° true (S by E ¾ E mag.) for the middle of the entrance, and when inside East Point steer 158° true (SE ¾ E mag.) in mid-channel heading for Stop Island. Anchor in 4 to 6 fathoms from 1 to 1½ miles northwestward of Stop Island. The water generally shoals gradually toward the shore and there are no dangers outside the 3-fathom curve.

Turnabout Island, lying 2½ miles off the southeastern shore of Frederick Sound, is 471 feet high, and wooded. The shores are fairly bold except at the south end. A temporary anchorage for small craft is afforded in the cove on the northwest side of the island. A wooded islet off the northwest side of Turnabout Island is marked by a light. A reef lies ½ mile southwestward of Turnabout Island; at high water it shows as two rocks about 10 feet high, but at half tide the reef shows for 300 yards southward and on the line of the bare rocks. There is a clear channel, 1½ miles wide, between these rocks and Pinta Rocks, which may be safely used in the daytime and with clear weather.

Pinta Rocks are two patches lying about 2¼ miles south-southeastward from Turnabout Island and about 1 mile off the main shore. The eastern one covers at about half tide, and the western one is bare about 8 feet at high water; at low water other rocks show close around them, and both patches are surrounded by extensive beds of kelp.

Keku Strait.—This channel (chart 8200) is narrow, with numerous reefs, islands, and irregular bottom, and vessels entering it should proceed with caution and avoid every appearance of kelp. It connects Frederick Sound with Sumner Strait between **Kupreanof** and **Kuiu Islands**, but the through passage is used only by small craft with good local knowledge. The entrance from Frederick Sound is between Point Macartney and Point Cornwallis.

Point Macartney, the northeast point at the entrance from Frederick Sound, is a long low, wooded point, terminating in an abrupt wooded islet with two bare masses of rock between, all connected by a rocky platform at low water.

Point Cornwallis, the southwest point at the entrance to Keku Strait, is low and wooded. There is a detached rock close inshore, visible except at highest tides; it may be safely passed at a distance of ½ mile.

Beginning 2 miles inside Point Macartney and extending 4½ miles in an easterly direction is a chain of reefs and wooded islets lying 1 mile from the northeast shore and parallel to it; the westernmost reef is marked by a buoy. On the north side of this chain of reefs and wooded islets, between them and the main shore, is a narrow channel leading eastward to the village of Kake.

Kake is a native village, post office and store on the northeast side of Keku Strait, 4½ miles southeastward of Point Macartney. An extensive flat makes off from the village and is marked at its outer edge by two buoys. There is a cannery and wharf ¾ mile southeastward of the village.

Grave Island is a small scrubby island south of the village of Kake, marked on its northerly side by a light.

Keku Islets, on the southwest side of Keku Strait, are a group of wooded islands with outlying reefs, between which there are no

practicable channels. A rock, bare at low water and not marked by kelp, lies 7/8 mile northeastward of the westernmost Keku Islet. There are other reefs on the southwest side, but they have portions showing above water and are easily avoided in the daytime.

Between Keku Islets and the reefs on the northeast side is a channel, 2 miles wide and 8 miles long, to Point Hamilton, with depths varying from 7½ to 50 fathoms. Southward of Eva Island the channel is about 1 mile wide, between Point Hamilton and Hound Island, and leads between kelp-marked rocks and shoals on both sides.

Eva Island lies 8 miles from Point Macartney and at a distance has the appearance of being in mid-channel. It is wooded and marks the turn of the channel when bound for Hamilton Bay or Port Camden. Off its western end is a bare rock.

Point Hamilton is ¾ mile east-southeastward of Eva Island. At it extremity is a mound-shaped point connected at low water with the point proper. This point marks the entrance to Hamilton Bay.

Hamilton Bay, on the northeast side of Point Hamilton, is a secure anchorage for vessels of any size. Its entrance is ¾ mile wide and clear, except for a kelp patch in which there is a depth of 3½ fathoms, ¼ mile from the northerly shore northeast of Eva Island. Hamilton Bay is 4 miles long in a general easterly direction; at its head are extensive flats bare at low water. Two large streams enter near its head.

The islands on the southwest side of the channel, from abreast Eva Island to the middle of Hound Island, are fringed with kelp to a distance of about ⅜ mile.

Hound Island lies 2 miles southeastward of Eva Island. It is 1½ miles long, low, and wooded, with outlying rocks at either end; on its northern side are extensive kelp patches.

A kelp patch, in which there is a depth of 4 feet, lies nearly ⅝ mile off the northwest point at the entrance to a bight in the northeast shore, and 1⅜ miles east of the east end of Hound Island.

A rock, with 10 feet over it and no kelp, lies ⅜ mile east of an unnamed islet and 1¾ miles south of the east end of Hound Island. A rock, with 16 feet over it and marked by kelp, lies nearly ⅝ mile from this islet in the direction of the east end of Hound Island.

Pup Island lies 2¾ miles southeastward of Hound Island. It is small, steep, and wooded, and marks the eastern point (Point Camden) at the entrance to Port Camden.

Port Camden, the entrance to which is on the west side of Pup Island and 15 miles from Point Macartney, is an inlet 13 miles long and 1½ miles wide for a distance of 5 miles from its entrance. At this point there are several islands, the most prominent of which, and lying in mid-channel, is **Cam Island.** From these islands the inlet contracts gradually to its head, from which there is a portage to Bay of Pillars. From the entrance to Cam Island there is 26 to 35 fathoms. Above Cam Island there is 8 to 27 fathoms, decreasing to 4 to 8 fathoms at 2 miles from its head.

From Point Camden Keku Strait trends eastward for 6 miles, the eastern half having no practicable channel for vessels. The strait then trends southeastward for 13 miles, varying in width from $\frac{1}{10}$

to 1 mile, the channel being shoal and very much obstructed. The strait then widens to 7 miles, and continues for 7 miles to Sumner Strait. Small local craft sometimes make use of this passage at high water in going back and forth between Sumner Strait and Frederick Sound. This is practicable, however, only for those with local knowledge and at high stages of the tide.

Tidal currents enter the northwestern part of Keku Strait and Port Camden from Frederick Sound. The observed maximum velocity in the open strait was 1¼ knots.

Directions, Keku Strait to Kake.—Head for the buildings at Kake on a 118° true (E ¼ N mag.) course, or head for the light on Grave Island on a 130° true (E ¾ S mag.) course, until up to the buoy 1 mile southward of Point White. Pass northeastward of the buoy and steer 121° true (E mag.), with the cannery southeast of the village a little on the port bow.

Small craft coming from southwestward usually pass 100 yards off the northwesternmost Keku Islet and head for the light on Grave Island, course 88° true (NE by E mag.), until within about ½ mile of it, and then pass northward of the island. This course leads clear of all dangers.

Saginaw Bay (chart 8214), on the south side of Point Cornwallis and 6 miles northward of Point Kingsmill, extends east-southeastward for 7 miles. The entrance, 1½ miles wide, is clear for 2 miles from Point Cornwallis. **Sachem Island**, small and wooded, lies in mid-channel 3 miles from Point Cornwallis. A rock, covering at three-quarters flood, lies ⅝ mile west of Sachem Island. Otherwise the bay is clear until approaching the head, where there are numerous islands with surrounding ledges.

Halleck Harbor (chart 8214), on the north side of Saginaw Bay 1½ miles inside Point Cornwallis, is the best anchorage in Saginaw Bay, but is open southwestward, and the bottom is generally hard and in places uneven. It is readily known by high white bluffs on its northern side. At the foot of these bluffs are some Indian houses and graves. A rock with 18 feet over it and marked by kelp lies 700 yards west-northwestward of the east point at the entrance. The best channel entering is ½ mile wide between the rock and the west point. The bight at the west end of the harbor dries at low water, and a ledge, partly showing at high water, extends from the foot of the bluffs about 400 yards, its outer end bearing north by east (mag.) from the east point at the entrance. Anchorage can be made in the middle of the harbor in 8 to 12 fathoms.

Security Bay.—This bay (chart 8214), having its entrance 1½ miles north of Point Kingsmill, is a secure anchorage, but the entrance and bay are obstructed by numerous islands and ledges, and it should be entered with caution. **Roadstead Island** lies in the middle at the entrance, from which a chain of three small islands, **Flat**, **Cedar**, and **Harbor Islands**, extends ¾ mile in an east-southeasterly direction. The entrance to the bay is southward of these islands. From the west end of Roadstead Island a ledge, mostly showing at high water, extends 200 yards south-southwestward. There is also a kelp-marked rock, with 10 feet over it, ¼ mile northwestward from the west end of Roadstead Island.

Bibb Shoal, usually showing kelp, lies on the south side of the entrance to Security Bay. Its north end is a 2¼-fathom spot and

lies ⅜ mile south-southwest of the west end of Roadstead Island. A rock, awash at lowest tide, lies 150 yards farther southward.

Christmas Island, bluff and 200 yards in diameter, is the largest of several small islands on the south side of Security Bay at its entrance. A ledge and several bare heads extend 400 yards westward from Christmas Island parallel with the channel. Between Christmas Island and Cedar Island the channel is nearly ¼ mile wide.

Cleft Island, in the middle of the bay 1 mile eastward of Christmas Island, is about ⅝ mile long and has a deep notch in its western end. At its eastern end are some bare rocks. A narrow islet, about ¼ mile long, lies close to the northern side of Cleft Island.

Cedar Bight, northeast of Cleft Island, is obstructed at its entrance by a ledge, bare at lowest tides and surrounded by kelp, lying between Cleft Island and Retaliation Point. The eastern part of the bight is shoal and rocky; otherwise the depths are 4 to 6 fathoms, rocky bottom.

Retaliation Point, ⅜ mile north of the west end of Cleft Island, is bluff, steep-to, and wooded.

A ledge, marked by kelp and with a rock bare except at high water near its outer end, extends ¼ mile northwestward from the west end of Cleft Island.

Indian Rock is a few feet above high water. There is a 6-foot patch 300 yards northwestward of Indian Rock.

Stewart Rock lies nearly ¼ mile northeast of Indian Rock, in line between it and a shallow bight in Cleft Island. The rock has 3 feet over it and usually shows kelp at slack water. The usual channel lies between Indian Rock and Stewart Rock.

The best anchorage in the bay is ½ mile eastward of Cleft Island in 9 to 11 fathoms, midway between the large island on the north side and a wooded islet and some bare rocks near the south side. The head of the bay is shoal and has several reefs, some of which cover at high water.

Anchorage can also be made between the west end of Cleft Island and Harbor Island, in 11 to 16 fathoms, with Retaliation Point bearing northeast.

Directions, Security Bay.—Keep about 1 mile offshore until off the entrance. Bring the southwest end of Cleft Island midway between Christmas and Cedar Islands, and stand in on the range, course 141° true (ESE ¼ E mag.). This course leads 300 yards southward of the east end of Roadstead Island and in mid-channel. When between Christmas and Cedar Islands, steer 149° true (SE by E ½ E mag.) for a wooded islet near the southern shore and pass 300 yards southward of Cleft Island and 250 yards northward of Indian Rock, taking care to avoid Stewart Rock. When Indian Rock is abeam, steer 129° true (E ¾ S mag.) and anchor in mid-channel about ½ mile from the east end of Cleft Island in 9 to 11 fathoms.

Band Cove (chart 8214), just north of Point Kingsmill and south of Bibb Shoal, at the entrance to Security Bay, is about ½ mile long A small vessel can anchor in the entrance in about 6 fathoms, but the cove is not clear and is open from northwest to southwest; with Security and Saginaw Bays so near its use is not recommended.

Yasha Island, lying 3½ miles east-southeastward of Point Gardner. is small, low, wooded, and surrounded by kelp to a distance of 200

yards. The water is good ¼ mile from the shore, though shoal for 1 mile toward the point, with depths of 5 to 10 fathoms, over which heavy tide rips will be found; these tide rips sometimes extend clear across to Point Gardner and along that shore northward as far as Carroll Island, in a manner dangerous to small boats.

Point Gardner, the south extremity of Admiralty Island, is long, low, wooded, and marked by a light, and it has two rocks 20 to 30 feet high 600 yards southward of the point. There is a prominent mound 400 feet high, ¼ mile back from the point, and 1¼ miles from the point is a prominent round hill 800 feet high. About 2½ miles back from the point the elevation reaches 1,000 feet. The water is good ¼ mile from the rocks off the point, but they should be given a berth of ½ mile on account of the tide rips frequently encountered here.

Surprise Harbor (chart 8242), on the east side of Point Gardner, is 1¼ miles wide and 2 miles long, open southward, has much kelp and is not a good anchorage. It is, however, a good lee when the wind is blowing strong down Chatham Strait. A kelp patch extends over halfway across the mouth from Bartlett Point. To enter, stand in on about a 20° true (N by W mag.) course, keeping from ¼ to ½ mile from the west shore, using caution and avoiding kelp. Anchor about mid-harbor in 7 fathoms, rocky bottom.

Murder Cove (chart 8242).—This body of water has its entrance between Bartlett Point and Walker Point, 2 miles northeastward of Point Gardner. The cove is ¾ mile wide between Walker and Bartlett Points. At ⅜ mile inside the entrance the channel contracts to 300 yards between a bare ledge on the east and two rocks, each with a clump of scrub, on the west. There is a light on the bare ledge. Above this the channel has a width of about 200 yards between kelp-marked ledges, and it is best to enter at low water when the dangers show. The tide rips are sometimes heavy across the mouth when the wind is strong against the current.

Bartlett Point is the end of a long, low, wooded strip separating Murder Cove from Surprise Harbor; the end of the point is two wooded islands joined by dry ledges. A bare ledge extends 300 yards southward, and foul ground marked by kelp extends ½ mile between southeast and southwest of the point, also over halfway across Surprise Harbor.

Walker Point, 1 mile northeastward of Bartlett Point, is the end of a low, wooded peninsula which separates Murder Cove from a foul bight northeastward of it. Ledges and kelp surround the point to a distance of ¼ mile.

Tyee is a post office and fishing station on the east side of Murder Cove 1⅛ miles inside Walker Point. The wharf has a depth of about 15 feet at its north end and more at its south end. The head of the cove is filled by a flat which comes down nearly to the wharf. There is good anchorage for a small vessel in mid-channel 150 to 200 yards west-southwest of the wharf, in 8 to 11 fathoms.

Directions, Murder Cove.—Enter about midway between Bartlett Point and Walker Point on a 358° true (NW by N mag.) course, heading to pass midway between a bare ledge, marked by a light, on the east, and a rock with a clump of scrub on the west. When the latter is about 200 yards on the port beam, steer 20° true (N by W mag.), keeping in mid-channel as defined by the ledges and kelp.

Carroll Island is prominent, but appears as a point of the shore; the water is good close to its south end.

Herring Bay (chart 8242), lying 6 miles northward of Carroll Island, is about 2 miles wide and the same long, with a tongue of land, prolonged by rocks and reefs, projecting halfway through the middle from the west shore, and a shoal place with kelp near the middle of the mouth in continuation of the tongue. There is a fair anchorage in the southwest corner of the bay, about ¾ mile from the head, but it is open southeast. To make the anchorage, follow the south shore at a distance of about ⅜ mile, course 293° true (W ¾ S mag.), and anchor ½ to ¾ mile from the head in 5 to 10 fathoms.

Chapin Bay (chart 8242) is a small inlet on the west shore of Frederick Sound, 8 miles northward of Carroll Island. Its total length is 2½ miles, width at entrance 1 mile, contracting to 250 yards halfway to its head, and above this expanding into a basin 1¼ miles by ½ mile, affording secure anchorage in 9 to 11 fathoms, sandy bottom. From the south point at the entrance a reef extends ⅝ mile north-northeastward, terminating in a ledge, reported bare at low water, lying in the middle of the entrance, the whole well marked by kelp. A ledge, bare at half tide, lies 330 yards from the north point at the entrance, and kelp shows about 400 yards southeast of the ledge. There is also kelp in the middle ¾ mile inside the entrance, and a shoal extends 150 yards eastward from the point on the southern side at the entrance to the narrows.

It is safest to enter Chapin Bay at low water. Enter about 400 yards southward of the half-tide ledge off the north point at the entrance on a 324° true (WNW mag.) course and keep the north shore aboard at a distance of 200 yards until in the narrows, when a mid-channel course leads safely to the anchorage.

Woewodski and Eliza Harbors (chart 8216).—These harbors have a common entrance between Point Napean and Deepwater Point, 11 miles northward of Carroll Island and 9 miles west-southwestward of Turnabout Island. The entrances are much obstructed by dangerous ledges, and with the close proximity of better anchorages the use of these harbors is seldom necessary. **Liesnoi Island**, about 1¼ miles long and of irregular shape, lies in the entrance.

Woewodski Harbor is the open bight between Liesnoi Island and Deepwater Point. Ledges and rocks, sunken or awash at various stages of the tide, and generally marked by kelp, extend northward from Liesnoi Island halfway across Woewodski Harbor. **Polivnoi Rocks**, three bare rocks surrounded by ledges, lie on the northwest side of this foul ground. The only anchorage for vessels in Woewodski Harbor is northeastward and northward of this foul ground in 20 to 26 fathoms, hard bottom, and exposed to southeast winds.

Eliza Harbor is a deep inlet with generally bold shores extending about 5½ miles in a north-northwesterly direction and about ½ mile wide. The only available anchorage is at the south end of the harbor, off the western side of Liesnoi Island. On each side of Liesnoi Island are narrow passages called, respectively, North and South Passage, leading to Eliza Harbor.

The North Passage to Eliza Harbor enters from the northwest angle of Woewodski Harbor; this passage is straight but narrow;

its northern shore is bold-to; its southern shore is foul, and sunken rocks and kelp patches extend to mid-channel, leaving a navigable passage 75 to 100 yards wide. The rocks on the south side of North Passage cause tide swirls; the ebb has a velocity of 4 knots, and the flood about 3 knots. This passage should be attempted only at slack water.

South Passage, south of Liesnoi Island, is reduced by sunken rocks at its narrowest part to a width of 70 yards, has a sharp turn and strong tidal currents, and should not be attempted except at slack water and with local knowledge. The sunken rocks are marked by kelp, but it does not show when the current is running. In northerly winds an indifferent anchorage may be had in the entrance to South Passage in 7 fathoms, with the southeast side of Liesnoi Island bearing 82° true (NE ½ E mag.), and Point Napean and Sharp Point in line, bearing 189° true (SSE mag.)

Directions, Eliza Harbor.—Enter Eliza Harbor through North Passage and at slack water. Keep ½ mile or more offshore until Woewodski Harbor is well open. Stand in between Liesnoi Island and Deepwater Point, keeping the eastern shore aboard at a distance of about 400 yards on a 3° true (NNW ½ W mag.) course, with Bluff Point ahead, until North Passage is opened north of Polivnoi Rocks. Then haul gradually westward, pass midway between the rocks and the north shore and keep the north shore of North Passage close aboard. There is not less than 6 fathoms in the passage, which was carefully examined. When through the passage haul southward and anchor in mid-channel in 18 to 20 fathoms, bottom soft in places, at two-thirds the distance toward Thumb Point, the southwest end of Liesnoi Island.

Spruce Island, 84 feet high, small, and wooded, lies 2 miles from the western shore; other and larger islands lie well northwestward of it in the entrance to Pybus Bay. **Round Rock** is 40 feet high and bare. There is a clear channel about 2 miles wide between Round Rock and the western shore, but the bottom is somewhat irregular, the soundings varying from 13 to 36 fathoms. The water is much deeper eastward of Round Rock and between it and The Brothers.

The Brothers, lying in the southern entrance of the northern arm of Frederick Sound and 2½ miles off the western shore, are 2 large islands and 12 smaller ones, all high and wooded. The largest is 2 miles long, 1 mile wide, and 649 feet high.

Pybus Bay (chart 8218), the entrance to which is about 5 miles wide, is filled with islands, shoals, and rocks and is open southeast. The water is deep, and it affords no advantages as an anchorage. Its entrance lies southwest of The Brothers and 9 miles northwest of Turnabout Island. The only protected anchorage in the bay is in a nearly landlocked cove on the south side 3½ miles within the entrance in 12 fathoms. The chart is the guide.

Ice.—Glacial ice in small quantities is generally present in the eastern arm of Frederick Sound, coming from Le Conte Bay, where at times there are enormous quantities. It generally follows the north shore as far as the entrance to Thomas Bay. With some conditions of wind and weather, ice may be expected as far as Sukoi Islands. It is sometimes seen at Cape Strait, and a piece has been seen at Turnabout Island. Occasionally a few stray pieces work into

Wrangell Narrows as far as Green Point. The size of the pieces is sufficient to make them dangerous.

The tidal current on the flood enters Frederick Sound from Chatham Strait; it sets northward into Stephens Passage and through the eastern arm. The ebb sets in the reverse directions.

Current observations made between Farragut Bay and Cape Fanshaw, and eastward of Portage Bay, showed the set to be diagonally across the sound, with but slight and variable velocity of current. The estimated velocity of the current in the sound is 1 to 2 knots at strength.

Near the middle of Frederick Sound, north of Boulder Point, the current turns from east to west 27 minutes after the time of high water at Sitka, and from west to east 29 minutes after the time of low water. The velocity of either current at strength is 0.9 knot.

Directions for vessels passing through Frederick Sound from Wrangell Narrows are given in the table of courses on page 23, and for vessels passing through Frederick Sound from westward, in the table of courses on page 25.

STEPHENS PASSAGE

(charts 8200, 8300) extends from its junction with Frederick Sound at Cape Fanshaw in a general northwesterly direction to Saginaw and Favorite Channels, which connect it with Lynn Canal. Numerous islands lie in both entrances to the passage, but otherwise it is open and deep and generally free from dangers. On its eastern and northern shores are several harbors and indentations, some of which afford good anchorages. The western shore has fewer indentations.

Gambier Bay (chart 8224).—Gambier Bay has its entrance on the western side of Stephens Passage south of Point Gambier. There are numerous islands and ledges in the entrance, but with the aid of the chart and the directions it can be readily entered in the daytime.

The bay is irregular in shape and is divided into two parts by a chain of narrow islands and reefs. The outer portion, extending from Point Gambier about 7 miles in a northwesterly direction, is about 2 miles wide at the entrance; its northern end is an inlet about 3 miles long and 700 to 300 yards wide, with 15 to 20 fathoms, soft bottom, affording anchorage.

Price Island lies 600 yards from the southwest shore of the outer bay. Ledges with two bare heads extend 5/8 mile southeast of the island. About 3/4 mile northwestward of Price Island is **Chapel Island**, of small extent. Ledges with bare heads lie between these islands. A rock, bare at low water and marked by a buoy, lies 3/8 mile northeastward of Chapel Island. Between Chapel Island and the northwest point at the entrance to the inner bay are several ledges, all marked by kelp.

Point Gambier, the northern point at the entrance to Gambier Bay, is the southeastern end of Gambier Island; the point is marked by a light. A rock, awash at low water and marked by kelp, lies nearly 3/8 mile southeast (mag.) from the light. A dangerous rock, bare 6 feet at low water, lies outside the bay 1 3/4 miles northwestward of Point Gambier and 5/8 miles offshore. A 15-foot shoal lies 3/8 mile eastward of this rock.

Romp Island lies 3/8 mile northwestward of Gambier Island, with ledges between.

The narrow but clear passage southwest of Price and Chapel Islands, and northeast of Gain Island and the unnamed island northwest of it, is the deepest entrance to the inner bay, and the mid-channel is clear.

Between Church Point and Gain Island is another entrance to the inner bay. It has a width of 300 yards between the bare ledges on either side and there is a rock with 18 feet over it in the middle. This entrance is more direct for vessels going to Snug Cove and may be reached by passing up the narrow but clear passage southwest of Price and Chapel Islands. This, however, necessitates a somewhat sharp turn around Church Point, and the better route is up the broader passage between Point Gambier and Price Island.

The inner bay is clear, so far as known, except for two pinnacle rocks, with 15 feet over them, which lie 1/2 and 3/4 mile east-southeastward of the cannery and on a line between the cannery and the nearest island. The rock nearest the cannery is marked by a buoy. The cannery is in the bight 2 miles west-northwestward of Gain Island.

Snug Cove, on the south side of the inner bay, has anchorage in 15 to 20 fathoms, soft bottom. A flat extends 1 mile from the head of the cove with deep water close-to.

In the southwest arm at the head of the inner bay there is anchorage in 15 to 17 fathoms, soft bottom, 1/4 to 3/8 mile southwest of the western islet of the chain in its entrance. These islets may be passed on either hand, but the wider channel is south of them. A flat extends nearly 1 mile from the head of the arm.

Tidal Currents have a maximum velocity of about 3 knots in the passage between Church Point and Gain Island, and some swirls occur around the ledges eastward and northward of Gain Island.

Directions, Gambier Bay.—Coming from southward, pass in mid-channel between the bare ledge southeast of Price Island and the southwest shore, and follow a mid-channel course through the narrow passage southwestward of Price and Chapel Islands; then follow the northeast shore of Gain Island and the large island northwestward of it at a distance of 200 to 250 yards. Pass 150 yards northeastward of the buoy marking the 2 1/2-fathom pinnacle rock 1/2 mile east-southeastward of the cannery.

To enter between Point Gambier and Price Island, round Point Gambier at a distance of 1/2 mile and steer 324° true (WNW mag.) until the southeast end of Romp Island and the buoy marking a rock bare at low water are on the starboard and port beams, respectively. Then steer 307° true (W 1/2 N mag.) for 1 1/4 miles with the cannery ahead. When the southeast end of Muse Island is slightly open northwestward of Gain Island cross over into the channel, for which directions are given above, and follow the northeast shore of the large island northwest of Gain Island at a distance of 200 to 250 yards.

Seymour Canal.—This body of water has its entrance south of Point Hugh, and extends in a northwesterly direction into Admiralty Island for 35 miles, with an average width of about 2 miles. The upper part of the canal, to a distance of 20 miles from its head, is filled with islands, ledges, and rocks. **Tiedeman Island,** 15 miles above Point

Hugh, divides the canal for a distance of 8 miles, and above Tiedeman Island is another large island called **Swan Island.** The waters of the canal are, in general, deep, and passing eastward of Tiedeman and Swan Islands may be navigated to its head, though above the former the passage is narrow and somewhat intricate. In the upper part of the canal the depths are moderate, and anchorage can be selected in places for which the chart is the guide. The extreme head of the canal is separated by a portage of less than ½ mile from Oliver Inlet.

Pleasant Bay (chart 8228) is a small cove which affords anchorage for small craft on the western side of the Seymour Canal 6½ miles above Point Hugh. There are two islets in its entrance. Pass in close eastward of the western islet, and anchor in 6 fathoms about 300 yards south-southeastward of that islet. A spit extends about 125 yards south-southeastward of the islet. The edge of the flat which fills the head of the cove is ¼ mile southward of the islet.

Mole Harbor (chart 8228), on the western shore of the canal 9 miles above Point Hugh, is about 2 miles long and nearly 1 mile wide, with soundings from 12 to 25 fathoms. A flat extends ⅝ mile from the head of the harbor with deep water close to its edge. Near the middle of the entrance is **Beacon Rock,** small and bare, and another bare rock about 200 yards west-southwest of it. The ground is foul between Beacon Rock and the southern point at the entrance. A small bare rock, called **Rasp Ledge,** lies ¼ mile north-northeast of the northern point at the entrance. At low water all dangers show. Enter midway between Beacon Rock and Rasp Ledge and anchor in 13 to 17 fathoms, sticky bottom, about 1 mile within the harbor, giving the shores a berth of ¼ mile.

A rock, awash at low water and surrounded by an extensive bed of kelp, lies 1 mile southeastward of the southeast end of Tiedeman Island.

Windfall Harbor (chart 8228) is on the western shore of Seymour Canal abreast the northwest end of Tiedeman Island. A large and high island, called Windfall Island, lies in the middle of the entrance. The harbor is about 4 miles long and about ¾ miles wide. A flat extends ¾ mile mile from its head, and a long bight on its western shore 1½ to 2¾ miles above Windfall Island is also dry at low water. The entrance is southeast of Windfall Island, the passage on the northwest side being foul. The soundings in the harbor range from 12 to about 16 fathoms.

Windfall Harbor should be approached only by the channel westward of Tiedeman Island, which is about ¾ mile wide. In using this passage keep in mid-channel, except at a point 2 miles above the southeast end of the island, where the western shore, which is bold, should be kept best aboard to avoid a patch of rocks about 600 yards off the eastern shore. Enter the harbor southeast of Windfall Island, and anchor anywhere in 15 to 17 fathoms, sticky bottom, preferably near the southeastern shore.

Point Hugh is the southern extremity of **Glass Peninsula,** a long, narrow, and moderately high strip of land, which separates Seymour Canal from Stephens Passage. There is a light on the easterly side of Glass Peninsula, 2⅞ miles above Point Hugh.

From Point Hugh to Point Arden the western shore of Stephens Passage is nearly straight, with some slight indentations and irregularities. There are no harbors or anchorages on that side, and no

outlying obstructions, except **South Island**, which lies 26 miles above Point Hugh. Midway Islands and Grand Island lie near the middle of the passage.

Midway Islands lie 16 miles northward of Point Hugh and 2 miles off the eastern shore of Stephens Passage. The group is two small, sparsely wooded islets, about 60 feet high, with rocks awash at highest tides between them. A ledge extends less than ¼ mile southeastward from the southeasterly islet, the whole group forming an obstruction ¾ mile long, southeast and northwest, and ¼ mile wide, with deep water close-to. The southeasterly islet is marked by a light.

Grand Island lies in the middle of Stephens Passage, 17 miles northwestward of Midway Islands and 4 miles southeastward of Point Arden. It is 2 miles long, 1 mile wide, and 1,500 feet high, with three knolls, and rises abruptly from deep water. There is a good channel on either side of the island, but that eastward of it is the one generally used.

Cape Fanshaw, on the easterly side at the junction of Stephens Passage and Frederick Sound, is a long, low, wooded point, terminating in a sand spit, with a large bowlder at the extreme end, and deep water as close as ¼ mile. The cape is marked by a light near its extremity.

Storm Islands are a wooded islet and several bare rocks, the southernmost of which, called **Bird Rock**, is 25 feet high 1½ miles northwestward of Cape Fanshaw. A shelving ledge extends ⅛ mile southwest of Bird Rock. There is no safe passage through the Storm Islands group, and the passage between Storm Islands and **Whitney Island** is narrowed to ½ mile by a ledge, bare at low water, lying ¼ mile from Storm Islands in the direction of its length.

Fanshaw Bay (chart 8216), on the northwest side of Cape Fanshaw, is over 1 mile wide at its entrance between the cape and Storm Islands, and 2¼ miles long to Whitney Island, which forms its north side. The bay is connected with Cleveland Passage by South Passage. Anchorage can be made on the southeast side at the head of the bay, about 600 yards offshore and ½ mile south of Whitney Island in 12 to 15 fathoms, bottom sand and shells, sheltered from northeasterly and southeasterly winds. There is a small fishing settlement and wharf on the southeast side of South Passage abreast the southeast end of Whitney Island.

Cleveland Passage (chart 8216), separating Whitney Island from the mainland, is ½ mile wide and affords good anchorage near its southeast end. The depths vary from 8 fathoms at its southeast end to 70 fathoms at the northwest end. The anchorage is about ¾ mile north of the narrowest part of South Passage, favoring the northeast shore, in 12 to 20 fathoms, soft bottom, care being taken to keep clear of East Spit. Winds from west to north bring in a slight swell, but do not appear to blow home with any force.

The entrance from northwest is much the safer, as from it a midchannel course leads safely to the anchorage. **South Passage** is 400 yards wide but is narrowed to 200 yards by sand spits, with a midchannel depth of 11 fathoms. At the north end of South Passage are East and West Spits, projecting northward, the former ¼ mile, into the southeast end of Cleveland Passage. The tidal currents have a velocity of 1 to 2 knots in South Passage.

Steamboat Bay (chart 8216) is 1 mile north of the northwest end of Whitney Island and has Foot Island on its northern side. This bay has 22 fathoms of water, and with the near proximity of Cleveland Passage has no advantage as an anchorage. **Foot Island** is connected by a sand spit with the small islet at the head of the bay. The narrow passage on the north side of Foot Island might afford shelter to small craft in 7 to 10 fathoms abreast the middle of the island.

The **Five Fingers** are a group of islets, larger ones wooded, and ledges 3 miles long northwest and southeast and 1½ miles wide. The southeast Five Finger is marked by a lighthouse and fog-signal station. A reef, covered at high water, extends 300 yards southwestward from it.

Sail Island, 5 miles northwest of **Southeast Five Finger Islands lighthouse**, is 308 feet high and wooded. It is conspicuous when approaching from northward.

Port Houghton, about 9 miles above Cape Fanshaw, is an extensive bay, 4 miles wide at its entrance and 12 miles long in an east-northeast direction. The south point at its entrance is a group of islands, the largest, Robert Island, 322 feet high. The waters of Port Houghton are very deep, and it affords no shelter. An exposed anchorage, the only one in the bay, may be found about 1¾ miles eastward of Robert Island about 300 yards off the southern shore, with The Twins open half a point west of Point Hobart, in about 15 fathoms, hard bottom. This anchorage is open to winter gales, and at times a heavy swell rolls in when there is no local wind. The near proximity of Cleveland Passage makes it unnecessary to use Port Houghton for an anchorage.

McDonald Rock lies in the broad part of Stephens Passage, 2⅜ miles southwest of The Twins and 8¾ miles north-northwestward of Southeast Five Finger Islands lighthouse; it is small, has 21 feet over it, with deep water close-to, and is marked by a buoy on its northwest side. The range of the southeast tangent of The Brothers over the middle of Sail Island crosses this dangerous rock, which is almost directly in the track of vessels from Cape Fanshaw through Stephens Passage.

The Twins are two wooded islets, 230 feet high, lying 9¾ miles north-northwestward of Southeast Five Finger Islands lighthouse and off the entrance to Hobart Bay.

Hobart Bay (chart 8218) has its entrance 14 miles above Cape Fanshaw and 3 miles eastward of The Twins. It is 1¾ miles wide at its entrance and extends about 6 miles in a general northeast direction. Off the southeast point at its entrance a ledge, bare at low water and marked by kelp, extends ½ mile offshore from an islet. About ½ mile inside Entrance Islet (lies in entrance, 458 feet high) projecting points narrow the bay to ¼ mile; between the points is a bar with a depth of 5½ fathoms on which are several rocks which bare at lowest tide. On the northwest side, just within the inner points, a narrow arm leads northwestward to an inner basin about ¼ mile in diameter, where a contracted anchorage in 10 fathoms may be found; to enter this basin pass northward of Entrance Islet and close northward of the rocky islets inside the entrance to the basin. The waters of Hobart Bay are deep, and there is no other anchorage.

Sunset Island is a large rounded islet, 400 feet high, which lies 3 miles southward of the entrance to Windham Bay.

Windham Bay (chart 8218) has its entrance 17 miles above Southeast Five Finger Islands Lighthouse. In the middle of the entrance is a small group of wooded islets, with a deep passage on either side; close to the northwest point at the entrance is another small group of islets. From its entrance, which is 1½ miles wide, Windham Bay narrows rapidly to a neck ⅛ mile wide connecting with a deep inner basin nearly 4 miles in length and ½ mile wide. This narrow neck is narrowed to 100 yards by a ledge on its north side, bare at low water. From the point on the south shore southeastward of the ledge a spur, bare at low water, extends about 20 yards. Between them the least depth is 7 fathoms. **Windham** is a post office and mining camp on the north side of Windham Bay at its head. Landing is made at a float. An extensive flat extends from the southeast side at the head, leaving a passage less than ¼ mile wide close to the north shore, up to Windham. An indifferent anchorage in about 20 fathoms may be had at Windham northwest of the flat. A fog bank of varying density frequently hangs over Windham Bay from the narrows well up toward the head, especially at night.

Windham Bay and its approaches are clear. In passing through the narrow neck, great care should be exercised and the south shore kept aboard at a distance of about 50 yards.

Thistle Ledge, covered at high water and marked by kelp, lies ⅝ mile from the eastern shore of Stephens Passage at Point Lookout, 3 miles southward of Point Astley. Between Thistle Ledge and Point Astley the shore is more or less foul; nearly ¼ mile west-southwestward of Point Astley is a bare reef, and ⅞ mile southward of the point is a small islet.

Holkham Bay (shown in parts on charts 8200 and 8300).—This is an inlet with two extensive arms which lies on the eastern side of Stephens Passage 10 miles northward of Point Hugh. The water in both arms is very deep, in some places more than 200 fathoms. The tidal currents have considerable velocity in the entrance to the arms and there is much floating ice, rendering the navigation somewhat unsafe. In both arms the shores are steep and high. **Point Astley** is the southern and **Point Coke** the northern point at the entrance.

A **cove** about ¼ mile in extent, close under the eastern side of Point Coke, might afford a lee and anchorage for small craft with heavy northwest winds blowing down Stephens Passage.

An **anchorage** with shelter from southeast winds may be had in the eastern bight between Point Astley and Wood Spit in 20 to 30 fathoms, hard bottom.

Harbor Island, in the middle just within the entrance to Holkham Bay, is high and wooded. Eastward of it, within ½ mile, is a group of five small islets, the small southernmost one called **Round Islet**. There is no safe passage through this group of islands. On the north side of Harbor Island the passage between that group and the projecting shoals from the mainland is ¾ mile wide, with depths of not less than 23 fathoms in mid-channel. At low water both shores are steep-to.

Wood Spit is a long narrow spit extending nearly ¾ mile in a north-northwesterly direction from the southern point at the entrance to Endicott Arm. At high water it shows as an island about 20 feet high with three trees. Two rocky spits, bare at low water, lie ¼ mile north of this island.

On the east side of the long, low, wooded point of the mainland northeastward of Harbor Island there is an extensive flat with bowlder patches, bare at low water. Sand Spit, a small islet, stands on the eastern edge of the flat; from it an underwater part of the flat extends nearly 1 mile south-southwest, on which are two rocks bare at low water, and lying respectively ⅜ and ¾ mile from Sand Spit. Between the end of this flat and Wood Spit the channel is ½ mile wide, with not less than 13 fathoms, leading into Endicott Arm. The banks of both shoals are steep-to.

Tracy Arm, the northern arm of Holkham Bay, takes a general north-northwesterly direction for 9 miles, then turns east-northeastward for 13 miles to its head, where there are two large glaciers, called the Sawyer Glaciers, extending to the water's edge. The arm is about ¾ mile wide and has no anchorage.

Tracy Arm is somewhat difficult of access except for small craft on account of tide swirls at its entrance and floating ice, and as no ranges ahead can be given extra caution should be observed in entering. The entrance is about 1 mile wide, but the navigable channel is ⅓ mile wide between a shoal always covered on the east and a shoal, awash at lowest tides, nearly ⅜ mile off the western point at the entrance, on the west.

To enter Tracy Arm, pass westward of Harbor Island, and steer 43° true (N by E mag.) with the west end of Harbor Island astern.

Endicott Arm, the southern arm of Holkham Bay, is 25 miles long in an easterly direction, with a width of 3 miles below Sumdum Island and narrowing to less than 1 mile at its head. In mid-channel of the arm, abreast Sanford Cove, is **Sumdum Island**, about 1¼ miles long, and midway between it and the northern shore are two small islets called **Bushy Islands**. At the head of the arm are the Dawes Glaciers, extending to the water's edge.

Fords Terror is a narrow inlet having a length of 5 miles in a north-northwesterly direction; its entrance is on the northern side of Endicott Arm 10 miles above Sumdum Island. A glacier, terminating at the water, is at its head. The narrowest part of this inlet is but 100 yards wide, and through it the tidal currents rush with great velocity.

Sanford Cove, on the southern shore of Endicott Arm 5 miles within the entrance, is the only available anchorage; it has a depth of 35 fathoms, and is protected except from northwest winds. A flat extends out 300 yards in the southeast part of the cove. An occasional piece of ice drifts into the cove, but it is not dangerous to vessels at anchor. **Sumdum** is a post office on the southeast side of the cove. Some mining has been done here.

Ice is discharged by glaciers in both Tracy and Endicott Arms, and is always present in Holkham Bay, sometimes in large quantities, and is prevalent in Stephens Passage off the entrance to the bay in greater or less quantities. This ice is dangerous at night or in thick weather, and in entering Tracy or Endicott Arms care should be taken when near the ice, as the swirls are often bad.

The Tidal Currents have an estimated maximum velocity of 4 knots at the entrances to Tracy and Endicott Arms, forming swirls, and much greater velocity in Fords Terror.

Directions, Holkham Bay and Endicott Arm.—In approaching from southward give the eastern shore of Stephens Passage a berth

of 1 mile or more. From a position ¾ to 1 mile northwestward of Point Astley steer for Sumdum Glacier, course 65° true (NE by N mag.), and pass in mid-channel between Wood Spit and the Round Islet group.

When the southwest point of Harbor Island shows midway between Round Islet and the largest one of the group north of it, bearing 291° true (W by S mag.), steer 111° true (E by N mag.), keeping the range, which carries clear in mid-channel. When the end of the long, low wooded point on the main shore northeastward from Harbor Island bears 330° true (NW by W ½ W mag.), steer 150° true (SE by E ½ E mag.) with Sumdum post office ahead, which leads well clear of the northern end of Wood Spit, inside of which are no dangers.

In approaching from westward pass about ½ mile southward of Point Coke and steer about 133° true (E by S mag.), leaving Harbor Island ¼ mile or more on the port hand. Follow around the south side of Harbor Island and the Round Islet group at ¼ mile distance, pass between the latter and Wood Spit, and proceed as directed in the preceding paragraph.

Port Snettisham (chart 8227) has its entrance on the northeast side of Stephens Passage, 7 miles northwest of Midway Islands and 10 miles east-southeast of Grand Island. It is 1½ miles wide at the entrance, and has a north-northeasterly direction for 5 miles, narrowing somewhat, and then divides. The north arm is 7½ miles long to the flat at the mouth of Speel River at its head. The south arm is 3½ miles long to the flat which extends 1 mile from its head, above which is a low valley 3 miles long to Holkham Bay. The port is entirely free from dangers, but there are large flats at the heads of all the arms. On account of the great depth of water it is not suitable as an anchorage, though in case of necessity a vessel might anchor in about 20 fathoms at the head of either the north or south arm, close to the flats. Snettisham is a post office on the southeast side of the port about 3 miles inside the entrance. Some mining has been done in its vicinity. Moderately heavy tide rips are sometimes found at the entrance.

Local attraction of the compass of considerable strength has been observed on the eastern side of Port Snettisham. The maximum amount occurs about ¼ mile south of Sentinel Point, where it is nearly 4 points easterly close inshore, decreasing to 2 points easterly in the middle of the port. From this point it decreases rapidly, and is not felt northward of Sentinel Point nor in the entrance. This local attraction increases the general easterly variation for this locality by the amounts stated.

Limestone Inlet (chart 8229), 2 miles southeast of Taku Harbor, is a narrow arm 350 yards wide and 1¾ miles long in a northeasterly direction. The depths are 13 to 18 fathoms in the lower half of the inlet, and a small vessel may anchor anywhere in mid-channel, but the holding ground is not very good, and with the close proximity of Taku Harbor vessels seldom find it necessary to enter. The upper half of the inlet is filled by a flat, most of which covers only at high water. Mining is in progress on the northwest side of the inlet.

Taku Harbor (chart 8229), on the northeast shore of Stephens Passage 3 miles eastward of Grand Island, is ¼ mile wide at the entrance between Stockade and Grave Points. In approaching from

southward its position is readily known by the projecting high land of Grave Point, and a light on that point. The harbor is about ½ mile long, a little less wide, and clear. There are a few Indian shacks at the head of the harbor; a flat extends out ⅜ mile in front of them. A cannery, cold-storage plant, store, and good wharf with fresh water are on the northeastern side of the harbor. The anchorage is in about 13 fathoms, soft bottom, favoring the eastern shore. A slight eddy current into Taku Harbor from Stephens Passage is sometimes noticed on the flood, and, with large tides, swirls are produced which cause a vessel to surge somewhat on her cables at times. The northerly winter winds from the interior draw through the valley back of the harbor with great force. In winter these conditions, when at their worst, render the anchorage somewhat dangerous.

Enter Taku Harbor on a 30° true (N ⅛ W mag.) course, heading about midway between two conspicuous houses at the head of the harbor. In 1916 the roof of one of these houses was green, and the other was red.

Slocum Inlet (chart 8229) lies on the eastern shore of Stephens Passage, 2½ miles north-northeastward of Grand Island. It is a little more than 1 mile long and less than ½ mile wide, but is nearly filled with flats. The water is deep close to the flats, and it does not afford anchorage.

Point Arden is a rocky bluff on the southwesterly side of Stephens Passage, 3½ miles northwest of Grand Island and 11 miles from Juneau. It is marked by a light.

Taku Inlet.—This inlet has a length of 18 miles from **Bishop Point**, at the entrance from Stephens Passage to the **Taku Glacier** at its head. There is no secure anchorage in the inlet on account of the exposure to floating ice and strong winds.

Temporary anchorage can be made in mid-channel in 6 to 8 fathoms, soft bottom, eastward of Range Point; and at the head of the inlet on the west side of the north point at the mouth of Taku River, in 12 to 15 fathoms, but the latter is more exposed to heavy floating ice and is somewhat dangerous from this cause. Except when the ice is thick the navigation is not difficult.

For a distance of 8 miles from Bishop Point to 2 miles above Jaw Point the water is deep and shores bold. Thence to Taku Point, a distance of 6 miles, the channel is narrowed by flats which extend about ¾ mile from the eastern shore and ½ mile from the moraine of **Norris Glacier** on the western shore, with depths in the channel of 5 to 9 fathoms.

Jaw Point is the prominently projecting point on the eastern shore 6 miles within the entrance; there are high cliffs on the eastern shore southward of it. **Range Point** is on the western shore 3 miles north-northwestward of Jaw Point.

There is a flat for 1½ miles along shore south of Range Point which extends off a greatest distance of ½ mile. It has depths of 6 to 11 feet over it within these limits and deepens to 10 fathoms in about ¼ mile.

Beginning at a point 2 miles northeastward of Jaw Point a flat extends from the eastern shore from ¾ to 1 mile in places to the 3-fathom curve and then deepens gradually to 5 and 6 fathoms in mid-channel. The shoaling is more abrupt as Taku Point is approached. The width of the clear channel at its narrowest part is

over ½ mile between this flat and that off the moraine of Norris Glacier.

Taku Point is on the eastern shore south of the mouth of the Taku River and 4½ miles northward of Range Point.

The **moraine** of Norris Glacier is surrounded by a flat bare at low water to a fairly uniform distance of nearly ½ mile. It is mostly steep-to at its edge.

The **Taku River mouth** is filled by a flat, the western limit of which is defined by the range of Jaw Point just open of Taku Point, except the northern half, which shelves off a little farther westward.

Taku River is reported to be navigable for canoes a distance of 60 miles. The pass up the river has been used by the prospectors going to the headwaters of the Yukon, who do not report favorably upon it. The current is swift.

Winds.—The conformation of Taku Inlet is such that northerly winter gales sweep down the inlet and across Stephens Passage with great force, often accompanied by a blinding snowstorm. Southeast gales draw through the inlet.

Ice.—Taku Glacier discharges an enormous quantity of ice into the inlet, and this ice is always present, sometimes in large quantities, and is present in Stephens Passage off the entrance. In daytime with clear weather it is not a serious menace to navigation.

The **currents** in Taku Inlet have greater velocity on the ebb than on the flood. At Taku Point the ebb current has an estimated velocity of 3 or 4 knots at times. At the entrance to Taku Inlet the velocity of the ebb current does not exceed 2 knots.

Gastineau Channel (chart 8235) extends west-northwestward for 13 miles from Stephens Passage, and then southward for 3 miles to Fritz Cove, separating Douglas Island from the mainland. Juneau, 8 miles above the southeastern entrance, is practically the head of navigation except for small craft, as above that point for 2½ miles to Salmon Creek, flats make out from both sides with only a narrow channel between. From Salmon Creek to Entrance Point, at the western end of Gastineau Channel, there is a bar on which the channel depth at highest tides is only about 5 feet.

Marmion Island is small, flat-topped, and bare of trees, and lies close to shore at the southeastern entrance to Gastineau Channel. It is marked by a light.

Sheep Creek Flat, 4½ miles above Marmion Island and close eastward of Thane, on the northerly side of Gastineau Channel, extends one-third the distance across the channel from the mouth of Sheep Creek, and is bare at low water. The outer limit of the flat is marked by a light.

Thane is the headquarters and mill of the Alaska-Gastineau Mining Co. located on the northeast side of Gastineau Channel 5 miles from Stephens Passage. There is a large wharf and warehouses, a general store, and a post office. Water can be had at the wharf. Thane is connected with Treadwell, Douglas, and Juneau by ferry, and with Juneau also by highway. At night the lights in the mill at Thane are conspicuous from Stephens Passage.

Treadwell and **Douglas** are post offices and mining towns on the southwesterly side of Gastineau Channel, 6 and 6½ miles from Stephens Passage. They are the headquarters of the Alaska-Treadwell Mining Co., operating extensive gold mines in the vicinity.

There are wharves with good depths at Treadwell and Douglas, and both are connected by ferry with Juneau and Thane. On both sides of the wharf at Treadwell the bank formed by the tailings from the mill is gradually encroaching upon the channel. This bank affords an excellent place for beaching a vessel for repairs. There is a sawmill at Douglas. Coal and fuel oil in somewhat limited quantities can be had at Treadwell.

Juneau Isle is a small, grass-covered, rocky promontory between Treadwell and Douglas and ⅛ mile off the southwesterly shore of Gastineau Channel.

Juneau is an important mining center and the capital of Alaska. It is situated on the northeasterly side of Gastineau Channel, 8 miles from Stephens Passage. There are several wharves for vessels; coal, water, gasoline, and distillate are obtainable. Ship chandlery in limited quantities and provisions of all kinds can be had. Lumber can be obtained from a sawmill. There are machine shops at which minor repairs to the machinery of vessels can be made, including welding.

Juneau has frequent communication by steamer with Puget Sound and Alaska ports, and regular local communication by small craft to Sitka and way ports, to Skagway, and to Kake Harbor and way ports. Cable and radio communication is had with other points in Alaska and with Puget Sound. There is telephone connection with all Gastineau Channel points.

There is a relief station of the United States Public Health Service at Juneau; the nearest marine hospital is at Port Townsend, Wash.

Anchorage can be made throughout the channel wherever the depth is suitable. The usual anchorage is off Juneau in 20 fathoms, soft bottom.

Winds.—Southeast gales may occur in the vicinity of Juneau at any season, but they are much more frequent in winter than in summer. They are usually accompanied by rain, but not always by mountain squalls. The strongest winds are in winter and are locally called "**Taku winds.**" They draw down the mountain passes from northward, in gusts, with terrific force. Their force is modified somewhat under the lee of the highland eastward of Juneau. The southeast winds in summer seldom blow home, and when they do the confined channel admits but little sea.

The flood **current** sets northwestward in Gastineau Channel past Juneau with a maximum velocity of about 2 knots.

A local attraction of the compass, which does not exceed ⅜ point in the track usually followed by vessels, has been observed in Gastineau Channel. There is a local center of attraction abreast of Sheep Creek, and in passing this point the local attraction has been observed to change from about ¼ point west to ¼ point east. Along the south shore a westerly local attraction has been observed for some distance eastward of Bullion Creek. These local attractions affect the general easterly variation for this locality by the amounts stated.

For directions, Gastineau Channel, see table of courses, page 23.

Oliver Inlet has its entrance on the south side of Stephens Passage, 4½ miles southwest of Point Arden, through a narrow neck 1 mile long and 200 yards wide. The inlet is accessible only at high water to boats and small craft, the narrow entrance being barred at low

water by a natural dam of rocks, over which the water pours like a waterfall except at slack water. At high-water slack small vessels drawing not over 6 feet can enter. The tidal currents in the entrance have a velocity of 6 to 8 miles, forming heavy swirls. There is a portage about ½ mile long connecting this inlet with the head of Seymour Canal.

Auke Cove lies on the south side of Stephens Passage southwest of Point Young and 12 miles westward of Point Arden. It does not afford anchorage except for small craft, on account of shallow water. A small vessel can anchor in the cove south of the island on the southwest side of Auke Cove in 8 to 9 fathoms, hard bottom.

Young Bay is the broad bight in the southern shore of Stephens Passage westward of Point Young. Scull Island, a grass-covered rock 50 feet high with deep water around it, lies in the middle off the entrance. Anchorage with shelter from southeast winds can be had about ½ mile from the southeast side of the bay at any point between Point Young and the head in 18 to 22 fathoms, soft bottom, taking care not to approach the shore closer than ¼ mile in any place. A portage connects the southwest side of Young Bay with Hawk Inlet.

Horse and **Colt Islands**, connected at low water, are about 200 feet high and wooded. Colt Island, the northerly one, has an islet about 25 feet high close-to northward of it, and has a ledge on its northern and eastern sides to a distance of about 600 yards.

Horse Shoal, ¾ mile northeast of Horse Island, is two patches ½ mile apart northwest and southeast, both of which are bare at half tide.

A small ledge, which covers at half tide, lies ¾ mile west-northwestward of the north end of Colt Island and 2 miles south-southwest of Outer Point.

Fritz Cove (chart 8302), on the northwest side of Douglas Island 1½ to 3 miles northward of Outer Point, affords anchorage and shelter from southerly and easterly winds. **Entrance Point**, at its northeastern end, is a wooded knoll connected with Douglas Island by a low spit north and west of Entrance Point is the Gastineau Channel flat. **Dornin Rock**, with 13 feet over it, lies ⅜ mile west-northwestward of Outer Point. **George Rock**, lying nearly 1 mile northwestward of Outer Point, covers at highest tides.

A rock, with 2 feet over it, lies ¾ mile southwestward of Spuhn Island, and on the range of the south end of **Spuhn Island** and north end of Douglas Island. Passing on either side of George Rock, follow the shore of Douglas Island, giving it a berth of ¼ mile. Anchor about 400 yards from shore and ⅜ mile southward of Entrance Point in 20 to 25 fathoms, soft bottom.

In the cove northwestward of Fritz Cove is a cannery and wharf. Entering the cove, pass ¼ mile southward and eastward of **Coghlan Island**, and with the summit of the island astern, head for the cannery on about a 48° true (N by E ½ E mag.) course.

Portland Island is ⅞ mile long, ⅛ mile wide, 200 feet high, and wooded. Its northwest end is prolonged by a reef which entirely covers at high water, except for two small patches ⅛ and ¼ mile from the island, which are bare rocks about 6 feet high. The northwestern end of the reef is covered about 10 feet at highest tides. The south side of Portland Island is foul for about 300 yards.

Strauss Rock, lying ½ mile south-southeastward of the southeast point of Shelter Island, has 12 feet over it. From the southeast point of Shelter Island a ledge, bare at lowest tides, extends 400 yards toward Portland Island. A 2¾-fathom patch lies outside of this ledge on the same line nearly ½ mile from Shelter Island.

Shelter Island is 7¾ miles long, high and wooded. At its northwest end is a dome-shaped peak about 1,200 feet high, which forms an excellent landmark when coming down Lynn Canal. The northeast side of Shelter Island is free from outlying dangers. Near its southeast end a spur makes into the channel about 300 yards. There is a light near the southeast end of the island.

Saginaw Channel connects Stephens Passage with Lynn Canal, and separates the northwest end of Admiralty Island, known as **Mansfield Peninsula**, from Shelter Island.

Favorite Reef, in the southeasterly part of Saginaw Channel, is ½ mile long in the direction of the channel, ⅛ mile wide, and bare at half tide. The south side of the reef is marked by a buoy. The reef lies ¼ mile from the Shelter Island shore, with a deep channel between, which, however, is seldom used, because it is partially obstructed at its southeast end by a reef which bares about 6 feet and extends out nearly ¼ mile from Shelter Island.

Barlow Cove, on the northeast side of Point Retreat, has a southeasterly direction for 4¾ miles from the outer point of the Barlow Islands, with an average width of ⅝ mile. The outermost Barlow Island, on the northeast side of the entrance, is marked by a light. Entering Barlow Cove, favor the Barlow Islands side to avoid the foul ground which makes out 400 yards from the shore inside of Point Retreat. There is a narrow passage between Barlow Point and Barlow Islands, through which 20 feet can be carried, but it is unfit for vessels, and except at slack water is filled with tidal eddies and swirls. Anchor ¼ mile from the southeast side at the head in 22 to 23 fathoms, soft bottom.

Faust Rock lies in Saginaw Channel 1⅛ miles from Barlow Islands and in continuation of them. It is of small extent, has 17 feet over it, and is marked by a buoy. It can be passed on either side.

Favorite Channel.—This channel connects Stephens Passage with Lynn Canal northward of Shelter Island. It is the channel used by vessels going from Stephen Passage to upper Lynn Canal points and Skagway.

Lena Cove lies on the northeast shore of Favorite Channel north of Point Lena. It affords a southeast lee, but the bottom is rocky and it is not a good anchorage. Rocks bare at low water extend 250 yards off the north side of Point Lena.

A rock , with 2 feet over it, is reported to lie 300 yards 316° true (WNW ¾ W mag.) from Point Stephens, the south point at the entrance to Tee Harbor.

Tee Harbor has its entrance on the northeast side of Favorite Channel, 1½ miles northward of Point Lena and 1¾ miles east of Aaron Island. It affords anchorage with good shelter. The usual anchorage is in the middle just within the points at the entrance, in 12 to 14 fathoms; small vessels can find a berth in the south arm in 18 to 22 fathoms, soft bottom. There is a cannery inside the north point at the entrance, and fresh water can be had at the cannery wharf. A

light is maintained on the north side of the entrance from about April 15 to October 15 of each year.

Aaron Island, lying 1 mile northeastward of Shelter Island and 2¾ miles northwestward of Point Lena, is 174 feet high and wooded. A shelving ledge largely covered at half tide extends ¼ mile southeastward from its southeast end. Cohen Reef, showing about 4 feet at highest tides, lies ⅝ mile east of the southeast end of the island. A rock about 15 feet high lies 400 yards northwestward of the western end of the island.

Eagle Reef lies 1¼ miles north-northwestward of Aaron Island; it is awash at highest tides.

Bird Island, 2 miles northeastward of the northwest end of Shelter Island, is 96 feet high and sparsely wooded.

Gull Island, 1¾ miles northeastward of the northwest end of Shelter Island, is wooded and 90 feet high. A bare reef extends 300 yards southwest from the eastern end of the island.

Amalga is a small settlement and post office reached by tram road from a wharf at the northwest end of a cove 1¾ miles northeastward of Bird Island.

Poundstone Rock, Sentinel Island, and the features northwestward in Lynn Canal are described on page 161.

For directions through Stephens Passage, see the table of courses on page 23.

LYNN CANAL

(charts 8302, 8303) extends from the junction of Chatham Strait and Icy Strait, at Rocky Island, in a northwesterly direction for about 55 miles to Seduction Point, where it divides into two arms, called Chilkat and Chilkoot Inlets. At Rocky Island, Lynn Canal is 5 miles wide; from Point Howard to Ralston Island about 3 miles wide; thence it averages 6 miles wide to Seduction Point. The canal is nearly free from dangers, and the water is generally very deep. The shores are, as a rule, very high and wooded, with many bare mountain peaks and small glaciers in nearly every ravine.

Rocky Island is a small grass-covered islet, 54 feet high, which lies ¾ mile southeastward of Point Couverden. It is marked by a light. There is deep water around it as close as 250 yards.

Couverden Rock, 2⅜ miles northward of Rocky Island, is 12 feet high, and should not be approached closer than 200 yards. It is the outer one of a group of islands and rocks which extend 4 miles east-southeastward from the western shore of Lynn Canal.

Naked Island is ¼ mile off the northeasterly shore of Lynn Canal, 5¾ miles northward of Rocky Island, and ¼ mile above the entrance to Funter Bay. It is marked by a light. **North Ledge**, awash at highest tides, extends ¼ mile northwestward from Naked Island. The other islands near the entrance to Funter Bay are described under the heading of that bay, on page 187.

Point Howard lies 6¾ miles north-northwestward of Rocky Island. A ledge, bare at low water, lies about 400 yards southeast of the point.

Point Retreat, the northwest extremity of Admiralty Island and the turning point from Lynn Canal to Saginaw Channel, is marked by a light and an unused lighthouse. Ledges, showing well at low water,

extend about 300 yards northwest from Point Retreat, and about the same distance off its west side for ½ mile southward.

Lynn Sisters are two wooded Islands, about 150 feet high, close to the western shore of Lynn Canal, 3½ miles southward of Little Island. They are connected with each other and with the shore at low water.

Little Island, the northwest one of an extended group on the east side of Lynn Canal, lies 8 miles above Point Retreat. It is 40 feet high, grass covered, and marked by a light. A ledge, covered at highest tides, extends ¼ mile north-northwestward from the island, and a rock with 17 feet over it lies 700 yards northwestward of the island.

Poundstone Rock, lying 3¾ miles eastward of Little Island and 1⅛ miles southward of Sentinel Island lighthouse, has 2¾ fathoms over it and is marked by a gas buoy. From the rock a ridge ½ mile wide extends 3 miles toward Vanderbilt Reef. Depths of 7 and 9 fathoms are found on this ridge 1¼ miles northwestward of Poundstone Rock.

Sentinel Island lies 3½ miles northwestward of the northwest end of Shelter Island and ¾ mile southward of Benjamin Island, and is marked by a lighthouse. A shelving ledge, which bares well at low water, extends ¼ mile from its northwest end. **North Island** lies northwestward of Benjamin Island. A shoal, with 9 feet over it, lies ¼ mile southwest of North Island.

Vanderbilt Reef, lying 4 miles westward of Sentinel Island lighthouse, is a rock covered at three-quarters flood and marked on its southerly side by a buoy.

Yankee Cove is on the northeast side of Lynn Canal 4½ miles northwestward of Sentinel Island lighthouse. There is some mining development in progress here.

Bridget Cove lies behind **Mab Island**, close northwestward of Yankee Cove. It affords anchorage for small craft in 6 to 10 fathoms with but scant swinging room.

St. James Bay lies on the southwestern side of Lynn Canal inside of Point Whidbey, 11½ miles northwestward of Point Retreat. This bay extends 5 miles in a northwesterly direction, is 1 mile wide at the entrance and 2 miles near its head, where a large stream enters, forming extensive mud flats. A temporary anchorage may be selected on its eastern side 2 miles within Point Whidbey, in 20 fathoms, soft bottom, but it is open to southeast winds.

From Point Whidbey the west shore of Lynn Canal extends in a northwesterly direction, with some indentations and rocky shore line, 3¾ miles to a narrow inlet leading into **Boat Harbor**, a basin ½ mile in extent, with 14 fathoms greatest depth and 16 feet at the entrance. It can be entered by small craft only because of its contracted entrance, which is about 100 feet wide in its narrowest part and apparently clear, though the turns are sharp. The currents have considerable velocity through the entrance.

William Henry Bay (chart 8302, insert), on the southwestern side of Lynn Canal, 9 miles northwestward of Point Whidbey, is about ¾ mile long and 800 yards wide; it is easy of access and the best anchorage in this vicinity; it is a good winter anchorage. Enter in mid-channel

and when the second waterfall is on the starboard beam anchor in 14 fathoms, soft bottom, about ⅜ mile from the head. The shores are high and bold. **Beardslee River** enters at the head, where there is a flat 350 yards wide.

About 4 miles northwest of William Henry Bay is **Endicott River**, coming in from westward through a narrow, deep gorge in the mountains. The mouth of the river is filled with a wide, dry sand bar, through which the river has cut a narrow channel close around the cliff on the southern side; a broad shoal makes out from the mouth of the river nearly ¼ mile.

Berners Bay is a large, deep indentation on the northeast side of Lynn Canal between **Point Bridget** and **Point St. Mary**. It has a north-northwesterly direction for 6 miles from Point Bridget, with a width of 3 miles opposite Point St. Mary. Extensive flats and several large streams make in at the head. This bay is open to southerly winds, but in fine weather temporary anchorage in 16 to 25 fathoms may be selected near the head; the chart is the guide.

Jualin Wharf is at the head of an arm 2 miles north of Point St. Mary, at which supplies are landed for the mines at Jualin, northwestward of the bay.

Northeastward of Point Bridget are two bights; the westernmost is filled by flats, and the water is shoal for over ¼ mile from shore. The east bight has its entrance 2 miles northeastward of Point Bridget. Its entrance is nearly blocked by a flat making out from the west point, leaving a very narrow channel, which follows the northeast shore at a distance of 150 yards and has a least depth of 16 feet. Inside the depths are 8 to 11 fathoms, and small vessels using caution can enter and find secure anchorage in 8 to 10 fathoms.

Point Sherman, on the northeasterly side of Lynn Canal, is prominent and is marked by a light and an unused lighthouse.

Sherman Rock lies ½ mile south-southwest of Point Sherman and has about 6 feet over it; it is marked by a buoy. A ledge, with 12 feet at its end, extends ⅜ mile westward from Point Sherman; it bares a considerable distance from the point at low water.

Comet is a wharf and few houses on the northeasterly side of Lynn Canal ¾ mile northward of Point Sherman. Supplies for **Kensington** and other mines are landed here.

Eldred Rock lies 1⅜ miles off the northeasterly shore of Lynn Canal; it is small, 35 feet high, and marked by a lighthouse and fog-signal station. A ledge extends about 300 yards west-northwestward from the rock.

Chilkat Islands are a chain of four wooded islands in the middle of Lynn Canal, which extends 5 miles southeastward from Seduction Point. **Seduction Island**, the southern one, lies 2½ miles northwestward of Eldred Rock. The island next northwestward of Seduction Island has a bight in its northern side, which affords anchorage for small craft with shelter from moderate southerly winds. A shoal, with depths of as little as 6 feet over it and terminating in a rock bare at low water, extends over ¼ mile northwestward from the southeast point of the bight. Favor the westerly point of the bight in entering.

Currents have an estimated velocity of 1 to 2½ knots at strength in the southern part of the Lynn Canal, diminishing in velocity toward

the head. It is probable that the current turns soon after the times of high and low water.

CHILKAT INLET

(chart 8303), the western arm at the head of Lynn Canal, is 9 miles long in a west-northwesterly direction from Seduction Point to McClellan Flats at the mouth of Chilkat River. At 2½ miles from Seduction Point the arm is narrowed to ¾ mile by Glacier Point, the moraine of Davidson Glacier; it then expands to 2½ miles and maintains this width for some distance, narrowing to 2 miles at its head.

Glacier Point is the wooded and grassy moraine of Davidson Glacier on the west side at the entrance to Chilkat Inlet. A flat, bare at low water and about ¼ mile wide, borders the western shore for 2 miles southward and the same distance westward of Glacier Point, but at the point it is only 200 yards wide.

Davidson Glacier lies back of the narrow wooded moraine at Glacier Point. It slopes uniformly back from the moraine.

A rock, bare 3 feet at low water, lies ¼ mile from the northeast shore of Chilkat Inlet 1 mile northwestward from Seduction Point.

From the point on the northeastern shore north-northeast of Glacier Point a ledge bare well at low water extends ¼ mile south-southeastward.

Letnikof Cove is on the northeast shore 2 miles eastward of Pyramid Island. An anchorage for small craft can be had near the head of the cove in 6 to 10 fathoms. Northwesterly winds blow home and bring in some sea. **Jenkins Rock** lies 1¼ miles eastward of Pyramid Island and ¼ mile from the northeast shore; it has 10 feet over it.

Pyramid Harbor is a bight in the southwest shore of Chilkat Inlet southwestward of Pyramid Island. Anchorage can be had in the middle of the harbor in about 20 fathoms, with plenty of swinging room for a single vessel. This is the best sheltered anchorage and holding ground for vessels in Chilkat Inlet. There is an abandoned cannery on the south side of the harbor.

Green Point, the northwestern point of Pyramid Harbor, has a shoal on its northern side to a distance of 400 yards with depths of 5 to 11 feet. From this shoal a ridge extends northeastward; a depth of 4 fathoms is found ⅜ mile northeastward and 5¾ fathoms ⅝ mile east-northeastward of Green Point. The latter sounding lies nearly midway between Pyramid Island and Anchorage Point.

Pyramid Island, grass covered and 86 feet high, is surrounded by a shelving beach and connected with the northeastern shore by a spit, bare at lowest tides. There are roadstead fair-weather anchorages on both the northwest and southeast sides of the spit. The edge of **McClellan Flats** at the mouth of Chilkat River lies about 1 mile northwest of Pyramid Island.

Chilkat River is a shallow stream about 50 miles long, flowing in a general east-southeasterly direction, and at its mouth is about 2 miles wide. This mouth is so choked with sand bars as to be practically closed for anything except canoes, and the bar at low water appears as if dry clear across. The village of **Klukwan** may be considered the head of boat navigation, though small canoes may go somewhat farther. There is a wagon road up the river starting from Haines.

CHILKOOT INLET

(chart 8303), the eastern arm at the head of Lynn Canal, is 25 miles long from Seduction Point to Skagway at the head of Taiya Inlet. It has a northwesterly direction for 13 miles, with an average width of 2 miles, where it divides; the eastern and principal arm, called **Taiya Inlet**, extends north-northwestward, with a uniform width of about 1 mile. Chilkoot Inlet has on its east side, and Taiya Inlet on both sides, lofty mountains with glaciers in their gorges. The mid-channel depths are great throughout. Katzehin River Flat and Indian Rock are the only dangers.

Flat Bay, on the western shore 4 miles from Seduction Point, is a shallow cove of small extent, from which low land extends across the peninsula to Letnikof Cove.

Katzehin River enters Chilkoot Inlet through a deep valley on the northeasterly side of Chilkoot Inlet, 14 miles above Eldred Rock lighthouse. From the mouth of the river a flat, bare at low water to its outer edge, extends two-thirds of the distance across the inlet, and along shore for 1½ miles on either side of the mouth. The southwest edge of the flat is marked by a buoy placed in 13 fathoms of water.

Battery Point, on the southeast side of Chilkoot Inlet, 15 miles above Eldred Rock lighthouse, is about 50 feet high and marked by a light.

Local attraction.—Battery Point is a local center of powerful magnetic attraction which affects vessels' compasses when in its immediate vicinity. A local attraction of about 1½ points westerly has been observed 600 yards off Battery Point, decreasing to about ½ point westerly on the opposite side of the channel close to the Katzehin River Flat. This local attraction diminishes rapidly northward and southward of Battery Point. It decreases the general easterly variation for this locality by the amounts stated.

Portage Cove, on the southwest shore, 2½ miles west of Battery Point, affords the best anchorage and shelter in Chilkoot Inlet. The anchorage is about ¼ mile off the wharves in 12 to 15 fathoms, soft bottom. Northerly winds blow home and bring in some little sea. From the anchorage the water shoals gradually to a gravel and bowlder beach, which is bare some distance out at low water, and the water is shoal 200 yards from shore.

Haines is a small town and post office on the west side of Portage Cove. It is an outfitting and starting point for the Porcupine Mining District, on a branch of the Chilkat River about 40 miles from Haines, which is reached by a road along the north side of Chilkat River. Mining supplies and provisions in limited quantities can be obtained. The wharf has about 17 feet at its end and there is a boat landing. A small local vessel running between Skagway and Juneau stops at Haines, and there is cable communication.

Fort William H. Seward, ½ mile southward of Haines, is an army post with a wharf for vessels and a cable station.

Low Point, on the northeasterly side of Chilkoot Inlet 2⅝ miles northward of Haines, is marked by a light.

Indian Rock, lying 1 mile westward of Low Point, is a dangerous reef, about ¼ mile long east and west, at the eastern end of which is a pinnacle rock awash at lowest tides. It is marked by a buoy placed close southeastward of the rock.

The **western arm of Chilkoot Inlet** is 5 miles long, and receives at its head a short stream which drains Chilkoot Lake; at the mouth of this stream is a flat nearly ½ mile wide. Anchorage can be had near the head in 25 to 30 fathoms, soft bottom. There is a cannery on the south side 1 mile inside the entrance.

Taiyasanka Harbor, 5¾ miles northwestward of Battery Point, is a small harbor at the foot of the Ferebee Valley. The harbor has a narrow entrance, and is about 1 mile long and ½ mile wide, protected from southward, but exposed to winter winds drawing down the **Ferebee Glacier.** There is 12 fathoms in the narrow entrance, which is 100 yards wide and close to the west side. A spit extends over halfway across the entrance from the west end of the bare part of a moraine that nearly closes the entrance. The tidal currents have an estimated maximum velocity of 3 knots in the entrance. Small craft can select anchorage near the southeast end of the basin in 8 to 15 fathoms, soft bottom.

Skagway is in the valley at the mouth of the Skagway River, at the head of a small bight on the east side of Taiya Inlet 10 miles above the entrance. The town is the terminus of the White Pass and Yukon Railroad, one of the principal lines for supplies for the Yukon River. A limited supply of coal is usually kept on hand. Water can be obtained at the railroad wharf through pipe and hose. Provisions of all kinds can be obtained. A berth for beaching a vessel can be selected on the flat. There is communication by telegraph and cable and a local vessel plies to Juneau.

The **anchorage** is near the eastern side, about 300 yards from the wharves, with the point westward shut out by the west point at the entrance, in 30 to 35 fathoms, soft bottom. The anchorage space is small, and the winds draw through the valley and anchorage. With northerly gales, a vessel is liable to drag anchor, owing to the steep pitch of the bottom. Under such conditions a safer berth can be had at the wharves. The north side of the anchorage is formed by the flat of the Skagway River, the edge of which extends eastward from the west point at the entrance, and lies inside the ends of the wharves, except toward the western end of the flat.

There are four wharves extending southward to the edge of the flat but the three westernmost are in ruins. The railroad wharf, the easternmost, extends along the foot of the bluffs on the east side of the anchorage, with deep water along its face.

Dyea, at the head of Taiya Inlet, is abandoned. The anchorage at Dyea is below the flats in 25 fathoms, and is more extensive than at Skagway but more exposed. The flat is bare for 1 mile at low water, and is steep-to at its south end.

Taiya River, at the head of the inlet, is navigable for boats and canoes about 8 miles above the flat during flood tide and at high water.

Courses and distances from Juneau to Skagway are given in the table of courses on page 23.

CHATHAM STRAIT.

Approaches.—In approaching Chatham Strait from seaward, Hazy Islands are distinctive from their position and form a good landmark when they can be seen. They are also sometimes useful for

fixing the position when it is thick inshore. The passage between them and Coronation Island is 7 miles wide. Depths of 50 to 70 fathoms were found 3½ miles northwest of them, and no other sounding has been done in their vicinity to 1916. A single line of soundings 1½ to 2 miles off the western side of Coronation Island gave depths of 30 to 40 fathoms. Cape Ommaney is high and an important landmark.

From Sumner Strait vessels enter Chatham Strait between Cape Decision and Spanish Islands. Approaching from southeastward at sea, it is suggested to make Coronation Island and pass between it and Hazy Islands. In thick weather, should Coronation Island not be sighted, a sharp lookout should be kept for Hazy Islands. The current sets northwest along the coast, with an estimated maximum velocity of 1 knot, depending on the wind, and should Coronation Island not be sighted a vessel may be set toward Cape Ommaney. There are several dangers off the north side of Coronation Island. When once in Chatham Strait the navigation is easy, for it is a wide and comparatively clear sheet of water, with fair steamer anchorages at short distances.

Chatham Strait is the most extensive of the inland passages of southeastern Alaska. It is 18 miles wide at its entrance between Cape Ommaney and Coronation Island and 14 miles between the cape and the west shore of Kuiu Island, with a length of 138 miles from Coronation Island northwestward to Rocky Island. The body of the strait is a clear, open, and deep sheet of water from end to end, but some of the bays and bights are foul. The west shore as far as Point Augusta is high, bluff, and rugged, and free from hidden dangers in the way of navigation from point to point, except in the vicinity of the easterly entrance to Peril Strait. The water is shoaler on the eastern side and the reefs extend out farther, but in most cases they are in the bights and bays, and in no case do they extend out beyond a line drawn ½ mile off from point to point, except a ledge about 1 mile offshore at Point Crowley.

The shores from Points Patterson and Ellis, south, are not surveyed, and it is well to give them a good berth, especially the eastern shore. The triangulation for the entire strait has been completed, so that courses can be relied upon.

The lead is of little use to navigators in these waters in thick weather, 20 and 30 fathoms being frequently found within a few yards of the shore, while ¼ mile from the beach 100 to 200 fathoms are not at all unusual. An almost universal feature is the occurrence of flats, with one or more small streams, at the head of all bights and inlets. The slope, from 8 to 10 fathoms to a few feet, is abrupt, and in approaching the head of an inlet at high water care should be exercised in anchoring to give the flats a sufficient berth to avoid grounding at low water.

The wind generally draws through Chatham Strait parallel to its axis, but if from northeast will come down Frederick Sound and be felt in heavy squalls through the divides in the mountains on the east side. It sometimes draws through Tenakee Inlet and Peril Strait if blowing strong northwest outside. Most of the west shore is so high and bluff that the strong southwest winds can not blow down into the strait, but draw around Cape Ommaney and northward through the strait, usually bringing fog and rain as far as Point Gardner.

The current sets northwestward along the coast, with an estimated maximum velocity of 1 knot, depending on the wind. In Chatham Strait the current has a maximum velocity of 1 to 3 knots, depending on the range of the tide. The flood sets northward in the strait, entering Frederick Sound and Peril Strait and meets the flood from Icy Strait and Cross Sound between Points Hayes and Augusta. Strong tide rips are found around the various points, sometimes extending a mile or more into the strait when the current is strong. These are dangerous for small, open boats, especially at points surrounded by broken ground. Sometimes, however, they will be encountered well offshore without apparent cause.

In the middle of the strait eastward of Traders Island the velocity of either flood or ebb at strength is 0.8 knot.

In the middle of the strait between Killisnoo post office and Tenakee Inlet the velocity of either flood or ebb stream is 0.8 knot.

Off Killisnoo the current turns 44 minutes after the time of high and low water at Sitka.

Chatham Strait is shown in part on charts 8150, 8250, and 8300.

Cape Ommaney, the western point at the entrance to Chatham Strait, is a remarkable promontory terminating in a bluff, rugged, rocky mountain, about 1,500 feet high, detached from the higher land northward by a low depression running through from Port Conclusion. **Wooden Island**, about 350 feet high and sparsely wooded, lies close southeast of Cape Ommaney.

Hazy Islands, **Coronation**, and **Spanish Islands**, and **Cape Decision** are described on pages 123 and 124.

Point Crowley is a prominent headland on the eastern shore, 8 miles northwestward of Cape Decision and 10½ miles southeastward of Point Harris. The point is flat at the end, but rises rapidly by an upward sweep to a head, probably 1,200 feet high and having a landslide on its south face; it then slopes upward less rapidly to a cone-shaped mountain probably 2,500 feet high, all well wooded. A rock, awash at half tide with an apparently clear channel inside it, lies 1 mile south-southwestward of the point. **Point Howard**, lying 3 miles southeast of Point Crowley, resembles it somewhat, but rises less abruptly. A tongue of comparatively low land, consisting of closely connected islands, lies 2½ miles northward of Point Crowley.

The eastern shore of Chatham Strait from Cape Decision to Point Ellis has several deep bights which have not been closely examined.

Table Bay, northward of Point Crowley, affords good anchorage in its northern part; it is reported to be clear.

Port Malmesbury.—This body of water has several good anchorages. Its entrance is on the eastern side of Chatham Strait, 18 miles northwestward of Cape Decision and 14½ miles northeastward of Cape Ommaney. It has not been surveyed, but is known to afford three good anchorages. The description following is from a reconnoissance by parties of the Coast and Geodetic Survey which entered the port in 1899 and 1900.

Point Harris is the north point at the entrance to Port Malmesbury. The land rises back of the point to a wooded peak about 1,500 feet high, on the south side of which is a large yellow landslide. The extremity of the point is a platform of bare rock, 40 or 50 feet high, extending over ¼ mile from the tree line. There is a rock, bare at low water, a short distance offshore inside of Point Harris.

Port Malmesbury is about 1½ miles wide. From its entrance it extends about 2 miles in a northeasterly direction, then turns to northwesterly for about 1½ miles, and then changes to about north-northeast for 2½ miles to its head. The shores of the port are somewhat rocky, and ledges show off all the projecting points. On the eastern side are two arms, which extend southeastward, and on the western side, back of Point Harris, is an arm extending southwestward, all good anchorages. On the eastern shore of the port is a large yellow landslide conspicuous from Chatham Strait when off the entrance.

The Southern Arm on the eastern side of Port Malmesbury has its entrance about 1¼ miles inside the entrance to the port. It has a width of ¾ to ½ mile, a general southeasterly direction at the entrance, curving eastward to its head, and a length of 2½ miles. In the middle, about ¾ mile from the head, there is a shoal having some kelp, on which a least depth of 15 feet was found, but there is probably less. It lies about ⅜ mile west of a point on the northeastern side, rising steeply to a heavily wooded mountain. Favor the southwest shore when passing the shoal. There is a good anchorage above the shoal, about 300 yards from the head of the arm, in 18 to 20 fathoms, muddy bottom.

The Second Arm on the eastern side of Port Malmesbury has its entrance about 3½ miles inside the entrance to the port. It is about 1 mile wide at its entrance, which width it retains for some distance and narrows to ½ mile at its head. It has a southeasterly direction for nearly 1½ miles, then turns eastward, and then southeastward again, forming a basin about ½ by ¾ mile in extent at its head, having a uniform depth of 8 to 9 fathoms, muddy bottom. The length of the arm is nearly 3 miles, and there are apparently no dangers. About 200 yards off the south point at the entrance is a small, round, wooded islet, with a good channel between, with depths of 12 to 16 fathoms. There is probably a good channel north of the island, but it has not been examined, and a ledge was seen well northwest of the island. Enter through the narrow channel between the islet and the south point at the entrance.

The Western Arm of Port Malmesbury is a basin about ½ by 1 mile in extent, having its entrance about 3½ miles inside the entrance to the port. Its general direction is southwesterly. The entrance is less than ½ mile wide, and the northwestern shore at the entrance is apparently somewhat foul. There is a rock covered at half tide nearly in the middle of the northern part of the basin. The depths in the basin range from 6 fathoms in the middle to 4 fathoms in the southern part, muddy bottom. In entering the basin favor well the southeast side, and anchor a little eastward of the middle in 6 fathoms, soft bottom.

The unnamed bight between Port Malmesbury and Gedney Harbor extends nearly to the basin at the northwest end of Port Malmesbury, with low land between. This bight is foul and of no value for shelter or anchorage.

Gedney Harbor has its entrance on the eastern side of Chatham Strait 2 miles north-northeast of Point Cosmos and 11½ miles southeastward of Point Ellis. It has not been surveyed, but affords good anchorage for small vessels, and with care is easily entered in the daytime. The description following is from a reconnoissance by

parties of the Coast and Geodetic Survey which entered the harbor in 1899 and 1900.

Point Cosmos lies 3½ miles north-northwestward of Point Harris. It rises by several broad terraces to a bare-topped mountain. There are a number of bare rocks within ½ mile of the point, and 1 mile below the point is a wooded islet, with a number of bare rocks southeast of it in the entrance to the foul bight above Point Harris. At Point Cosmos the shore trends north-northeast for nearly 2 miles to the entrance of Gedney Harbor.

The harbor is a horseshoe-shaped cove, averaging about ¼ mile in width, which surrounds a wooded high-water island over 1 mile long. The passage northeast of the island is blocked at its northwest end by rocks and reefs.

The entrance to the harbor is on either side of a ledge about 400 yards long, lying less than ¼ mile southwest of the island. The northwest and southeast ends of the ledge are bare heads which show but a few feet above the highest tides. The channels on both sides of the ledge are apparently clear; from the south point at the entrance a bare ledge, having kelp close around it, extends a short distance.

From the entrance the harbor extends east-southeastward about 1 mile, and then turns around the southeast end of the island and trends north-northwestward, curving more westward to the rocks which block its northwest end. A ledge, having kelp, extends a short distance from the southeast end of the island; a rock just shows at high water about 25 yards from the island.

Anchorage may be made in mid-channel with the southeast end of the island bearing north-northwest, in 7 to 9 fathoms, muddy bottom; also in a slight expansion about halfway up the arm on the northeast side of the island, in 5 to 8 fathoms, muddy bottom. The harbor is sheltered from all winds, but its size makes it suitable only for small or moderate-sized vessels.

Tebenkof Bay has its entrance on the eastern side of Chatham Strait south of Point Ellis. It is about 7 miles wide at the entrance, the general course of the main bay being about east-northeast for 7 or 8 miles, when it divides into several arms, some of which reach within a short distance of the eastern shore of Kuiu Island. This bay is not surveyed, and no description is available.

Bay of Pillars (chart 8241).—This bay is 7 miles wide at its entrance between Point Ellis and Point Sullivan, and makes in 2½ miles in its main part; it has two arms, with secure anchorages. There are many islands, rocks, and reefs in the bay, especially between the two arms, but a deep channel leads into each arm.

Point Ellis, the southeast point of Bay of Pillars, is 16 miles north-northwestward of Point Harris. The point is low and rocky, with a high wooded ridge rising steep and bluff back of it, having a prominent landslide on its northwest face. There is a bare reef ⅝ mile west-northwestward of the point, with kelp between; the highest part of the reef is marked by a light. Kelp extends ½ mile northward from the reef, and is marked at its extremity by a buoy. A temporary exposed anchorage can be had ¼ mile from shore northward of Point Ellis and about northeast of the light, in 10 to 12 fathoms, rocky bottom.

Point Sullivan, the northwest point of Bay of Pillars, is low and wooded. The land rises gradually back to a ridge about 2,800 feet high, with the tree line 500 to 800 feet below the top. A chain of islands and bare rocks extends 1 mile southeastward from the point. Eastward of these islands is a bight ¾ mile long and ⅜ mile wide, in the middle of the northern end of which temporary anchorage, open southward, can be had in 13 to 15 fathoms.

South Arm of Bay of Pillars extends about 10 miles north-northeastward from Point Ellis, and is comparatively clear for 4½ miles, or 1 mile above the cannery. Above this the arm is very foul and is suitable only for small craft with local knowledge. A narrow channel, 1 mile long and about 100 yards wide, leads to a bay at the head of the arm. Only small craft should enter this bay, and then only at or about slack water, which occurs at or near high and low water. Aside from the current in this neck, there are sunken rocks in the channel which may be seen at low-water slack.

There is a cannery and wharf on the southeast side of South Arm 3½ miles above Point Ellis. Anchorage can be had 300 to 400 yards northwestward of the cannery in 12 to 20 fathoms, but the bottom drops off abruptly, and care should be taken at high water to keep off the flat, which extends 250 yards from the mouth of the stream northeast of the cannery.

There are four small islands on the southeast side of the arm 1 mile above the cannery, and there is a secure anchorage for small vessels about 400 yards northeastward of them and the same distance from the southeast shore, in 10 to 11 fathoms. It is safer for a stranger to enter at low water. The channel is about 200 yards wide between the northwest end of the islands and a group of bare rocks, which show much larger at low water than at high. It then follows the northeast side of the islands at a distance of about 150 yards to avoid a sunken rock marked by kelp about halfway between these islands and the larger island 600 yards northeastward.

North Arm of Bay of Pillars has a very irregular bottom and much kelp and is suitable only for small vessels. Strangers should preferably enter at low water and exercise care.

A shoal of small extent, with a depth of 4 fathoms and deep water around it, lies ¾ mile south of the narrow entrance to North Arm. It is marked by kelp.

The entrance to North Arm, lying 5 miles northward of the light off Point Ellis, is 600 yards wide, with depths of 10 to 20 fathoms and foul shores. Thence the arm trends about north-northeastward, curving northeastward, and widens to ½ mile. At 1¼ miles within the entrance there is an island in the middle and irregular bottom and kelp nearly across. The deep channel follows the south and east sides of the island at a distance of about 200 yards. The passage northwestward of the island has kelp across it and much foul ground.

Northward of this island the arm has a northerly direction for 2 miles, an average width of 1 mile, depths of 6 to 12 fathoms, and is a secure anchorage. Two large streams enter the head, and an extensive flat borders the entire north shore between them to a distance of over ½ mile, but the shoaling is gradual up to 3 fathoms.

Washington Bay (chart 8241), on the northeastern side of Chatham Strait, 2½ miles northward of Point Sullivan, is 1½ miles long and

¼ mile wide, with deep water and high steep sides. The entrance is not visible far from shore, but some bare rocks mark the north point at the entrance, and the channel is clear south of them. There is anchorage at the head in 18 to 22 fathoms, soft bottom. A stream enters at the head with a small flat in its mouth. There are no dangers in the bay, and the only directions necessary are to give the shores a berth of about 100 yards.

Point Kingsmill, on the northeastern side of Chatham Strait at its junction with Frederick Sound, is marked by a light.

Frederick Sound is described on page 136.

Breakfast Rock lies about ⅜ mile off the southwestern shore of Chatham Strait at a point 4 miles north-northwestward of Cape Ommaney It is small in extent, 7 feet high, bare, and has deep water close-to.

Port Alexander (chart 8262), a small basin having a clear entrance less than 200 yards wide, is 2 miles southward of Point Conclusion. The entrance lies ½ mile south-southwest of a small island which stands about ¼ mile offshore and has some rocks near it. The depth in the entrance is about 4 fathoms, on which kelp grows, and within the depth varies from 3 to 8 fathoms. This harbor is considerably used by small fishing craft during the summer months, at which time a small general store is sometimes conducted at its head.

Point Conclusion lies on the western shore 6 miles north-northwestward of Wooden Island. The point is the northeast end of the comparatively low peninsula between Ports Alexander and Conclusion. The end of the point is flat and low, and just back of it is a wooded knob or hill about 400 feet high. A little farther westward is a broader hill of about the same height. The point is projecting and visible from northward of Point Patterson.

Port Conclusion (chart 8262) is 1½ miles westward of Point Conclusion; at its entrance it is about 1 mile wide, and it is about 2 miles long in a southerly direction to its head, where it is less than ¼ mile wide. The soundings are deep and somewhat irregular, but there appear to be no outlying dangers. On the east shore of the port, ¾ mile south of the small wooded islet which forms the eastern point at the entrance, is a cove about ¼ mile wide; having a sandy beach at its head. About ½ mile farther south, on the same shore, is **Ship Cove**, where Vancouver moored his vessels. This small cove is but 200 yards wide and 400 yards long, with its entrance contracted by some outlying rocks, within which is a depth of 4 or 5 fathoms; it can be safely used only by small craft. The only **anchorage** in the port for vessels is on a rocky spur making out from the west side just northward of Ship Cove. The anchorage is in mid-channel, in 12 to 20 fathoms, rocky and uneven bottom, and lies between two inconspicuous points, one on either side. Elsewhere in the port the water is deeper.

Port Armstrong (chart 8262), 2¼ miles northwest of Point Conclusion, is a landlocked anchorage, the best in the vicinity. From Point Eliza, the south point at the entrance, a narrow ledge, mostly uncovered shortly after high water, extends northeastward, in continuation of the point, about 200 yards. During the summer months a light is maintained on the north point at the entrance. On the southeast side of the north point at the entrance kelp extends out

about 200 yards. The least depth found in the kelp was 6¼ fathoms, with a possibility of less. The narrow entrance to Port Armstrong is nearly ½ mile long and about ⅛ mile wide, with bold shores and not less than 8 fathoms in mid-channel. Within this entrance the basin is about 1 mile long and ⅜ mile wide. The soundings are fairly regular, from 30 fathoms in the middle to 10 fathoms near the shores. Just within the entrance, on each side, are sand beaches and fresh water. There is a whaling station and reduction works on the sand beach on the northerly side. The best anchorage is in the southwest end of the basin in 12 to 15 fathoms, soft bottom. A mid-channel course carries in safely.

Port Lucy has its entrance on the western shore 5 miles northward of Point Conclusion. The port has a south-southwesterly direction for 3 miles, narrowing from 1¼ to ⅜ mile; it then trends slightly southward for 2 miles, first expanding somewhat and then narrowing to ¼ mile at its head. The anchorage for large vessels is near the head, abreast a deep gulch on the west side, in about 20 fathoms; the port is here about ⅜ mile wide. Small vessels can go a little farther in and anchor in about 10 fathoms. From the head of the port low land extends through to the western side of Baranof Island at Puffin Bay, and winds from those quarters may draw through in consequence, but without any sea. The port is easy of access, and there are apparently no dangers.

Toledo Harbor is a small, horseshoe-shaped bay with depths of 9 fathoms, mud bottom, which lies ¾ mile northward of Port Lucy. It is considerably used by small local fishing craft. It has not been examined, but the following is taken from reports. The entrance is about 40 yards wide and has a least depth of 5 fathoms. A rock, with 5 feet over it, lies close to the eastern shore. The western shore is bold. Enter on approximately a west-southwest (mag.) course.

Port Walter has its entrance 8 miles northward of Point Conclusion and 9 miles southward of Point Patterson. Its southeast point at the entrance is marked by a light. It is about ¼ mile wide at its entrance and has an outer part ¼ to ⅜ mile wide and 2 miles long in a southwesterly direction. Near its head is a wooded islet, a little southeast of mid-channel, between which and the western shore anchorage in 14 fathoms, sandy bottom, can be made, with the islet bearing about east. About southwest of the islet is the entrance to a narrow passage ½ mile long leading to an inner basin. The passage is nearly straight, about 100 yards wide at its entrance and ¼ mile wide at its western end, with a depth of 25 fathoms in its narrowest part. The basin is about ½ by 1 mile in extent, with depths of 25 to 50 fathoms; a large stream enters its northwest end, and two at its south end—one by a cascade. Anchorage can be made close to the west side at the south end abreast the cascade in 30 fathoms, soft bottom; the shore is bold-to. This is probably the best winter anchorage in the port. It is easy of access, and there are apparently no dangers.

Close inside the south point at the entrance to Port Walter from Chatham Strait is a small bight having a flat, grass-covered rock and a wooded islet across its entrance. At the head of the bight is a passage 40 yards wide, across a bar, with a depth of about 6 feet at low water. This passage leads to **Inner Port Walter**, a basin about

⅜ by ¾ mile in extent, with depths of 5 to 7 fathoms, muddy bottom, and good holding ground. A creek enters the head of the harbor. Southwesterly winds draw down the creek and across the harbor, but no other winds are felt. There is a herring cannery on the south side of the point at the northeast end of Inner Port Walter, and the harbor is frequented by a considerable number of fishing vessels. Steamers of 15 feet draft enter at high water and go to the cannery. The principal dangers in the narrow entrance are a reef which extends 100 feet northwestward from the point on which the cannery is located and a rock 50 feet offshore on the opposite side of the channel. In 1916 these two rocks were marked by barrel buoys. Enter midway between the two buoys. Inside the entrance there are no dangers.

Port Herbert has its entrance 10½ miles northward of Point Conclusion and 6½ miles southward of Point Patterson. It has a width of ¼ to nearly ½ mile and a length of 3½ miles in a west-southwesterly direction to its head. The water is too deep for anchorage, and there are apparently no dangers. There are no islets or rocks at its entrance, which distinguishes it from Port Walter.

About 4 miles above Port Herbert and 2 miles below Point Patterson is a small bight used for anchorage by small local fishing craft during the summer months. A rock, covered at three-quarters tide, is reported to lie off the south point at the entrance.

Patterson Bay has its entrance south of Point Patterson, where it is about 1½ miles wide. On the south side of the bay, abreast Point Patterson, is a small cove in which a stream enters by a waterfall visible from well northward in Chatham Strait. The western arm of the bay, with a width of ⅜ mile, extends 2 miles west-southwestward, at which point a stream with a flat at its mouth enters from westward. From the south side near the head an arm extends about 1 mile southwestward, with the same width to its head, where a stream enters by a waterfall. Anchorage can be made near the small flat below this waterfall in 20 to 25 fathoms. The water in the bay is otherwise too deep for anchorage. From just inside Point Patterson the northern arm extends about 6 miles northwestward, with a width varying from ¾ mile to 200 yards. Contracted anchorage in 22 to 24 fathoms can be made below the wooded islet at the head and abreast a small green point on the west side, formed by the débris from the cliffs above it. Several streams enter. No directions are necessary, and there are apparently no dangers in either arm of the bay.

Point Patterson, on the west side of Chatham Strait, 17 miles north-northwestward of Point Conclusion, is the north point at the entrance to Patterson Bay. It is high, bluff, and bold, and is the southern end of a high mountain ridge, included between the north arm of Patterson Bay and Chatham Strait, extending northward to a series of high rugged peaks named The Sisters. The point is conspicuous from southward, the north arm of Patterson Bay showing as a deep gulch in the high rugged mountains.

Gut Bay (chart 8242) is on the west side of Chatham Strait, 11½ miles northward of Point Patterson and 10 miles south-southwestward of Point Kingsmill. At ¼ mile northeastward of the narrow entrance and 250 yards from the south side is a rocky patch with 4½ fathoms; vessels should pass northward of it. The entrance is

about 100 yards wide with bold shores, and the bay is from ¼ to ¾ mile wide and 4¼ miles long. The sides are bluff, bold, and rocky, in some places almost perpendicular for 1,000 feet or more. On the south side, 2½ miles from the entrance, are some small islands, and just past these is the narrow opening of a little bay, between high ridges, with a depth of 4 feet. A small craft can enter this bay at high water and anchor in about 3 fathoms. The water in the main bay is deep, but a temporary anchorage can be had on the south side ½ mile within entrance, off a rocky ledge and small stream, in about 20 fathoms, but it is not good, as the bottom is rocky and the wind draws through. A fair anchorage can be had near the head in 10 to 20 fathoms:

Hoggatt Bay (chart 8242) is 2 miles northward of Gut Bay and extends back into the mountains of Baranof Island 3 miles with an average width of ½ mile. The sides are steep and bold and the water deep, over 100 fathoms through the middle, leaving no room for anchorage. A small vessel may possibly find an indifferent anchorage in a cove on the south side ¾ mile within the entrance in about 29 fathoms, hard bottom.

Red Bluff Bay (chart 8242) is 4½ miles northwestward of Hoggatt Bay and 9 miles southwestward of Point Kingsmill, and is named from the prominent rocky, red hills north of it, which come down to a low point on the north side of the entrance, and which, with some small islands in the mouth, almost close it. The bay extends back into the mountains 4 miles in a general westerly direction, with an average width of ½ mile, though about the middle it chokes to less than 100 yards between high cliffs, but the channel is good. On the south side at the head is a large stream; a flat extends ⅜ mile from the head and ¼ mile northeast from the mouth of the stream. The entrance is about 100 yards wide, though the channel is less; it is crooked, but clear between the lines of kelp, which are close to the shore. A small vessel may anchor just inside the entrance in the channel between the islands and the south shore. An anchorage can be had 1¾ miles from the entrance, where the bay begins to narrow, in 8 to 12 fathoms nearly in mid-channel, but the bottom is rocky, and the wind sucks through strong when blowing in the strait. At the head, favoring the north shore and north of the flat at the mouth of the stream, is a good anchorage in 12 to 16 fathoms with soft bottom and perfect protection. There is a cannery near the head of the bay.

To enter **Red Bluff Bay**, follow around the south shore, keeping about the middle between it and all the islands and clear of the kelp. The last island may be left on the port hand, in which case favor the island side when north of it; the narrow channel south of it is also good. When past the islands a mid-channel course carries clear to the anchorage at the head of the bay.

Between Red Bluff Bay and Cascade Bay, 11 miles northward, are four small bays, the largest being 1¼ miles long and ½ mile wide, where small craft may find a depth suitable for anchorage in smooth weather, but only one, Nelson Bay, has protection. None of the bays is important.

Nelson Bay, 5½ miles southwestward of Yasha Island, is an open bight at the head of which is a circular cove having two islets across the entrance. The entrance to the cove is between the north islet and

the point north of it, and is 75 yards wide with a depth of 5 fathoms. The cove is 250 yards in diameter between the 10-fathom curves, and the general depth is 15 fathoms, soft bottom. This cove is suitable only for small craft.

Cascade Bay is on the west side of Chatham Strait 4½ miles west-southwestward of Point Gardner. It is about 1 mile long and ⅓ mile wide, with deep water, rocky bottom, and no good anchorage. Temporary anchorage can be had in the middle of the bay in 27 fathoms. At its head is a prominent cascade, seen from a distance in Frederick Sound. South of this bay 1¾ miles is a waterfall, about 300 feet high, which also shows well in Frederick Sound.

Warm Spring Bay (chart 8243), on the west side of Chatham Strait 7 miles 308° true (W ¾ N mag.) from Point Gardner, has good anchorage for small craft, but the anchorage for large vessels is indifferent. The bay is 2 miles long and ¾ mile wide at its entrance, but is narrowed to ¼ mile just inside by a projecting peninsula from the north shore. A bare rock about 15 feet high lies in the middle of the entrance, ¼ mile off the eastern point of the peninsula. There are two small bights in the southern shore affording anchorage for small craft. The western one is preferable because of shoaler water—12 to 15 fathoms. Two rocks with but little water over them are reported to lie about 200 yards off the south shore of Warm Spring Bay, the probable location being just east of the western bight. At the head of the bay is a waterfall, visible from Chatham Strait, and near the waterfall there are several warm mineral springs. The only anchorage in the bay for large vessels is in mid-bay, abreast the western bight on the south side, in 25 fathoms; but the bottom is rocky, and the current from the cascade usually sets out, making a vessel lie broadside to southeast winds which draw into the bay. Enter south of the rock in the entrance. There are no dangers in the bay if the shores be given a berth of about 100 yards. The point on the south side at the entrance is marked by a light.

Takatz Bay (chart 8243) has its entrance on the western side of Chatham Strait, 10½ miles west-northwestward of Point Gardner and 15½ miles southeastward of Point Thatcher. It extends in a general south-southwesterly direction, with an average width of ¼ mile for 2 miles, and then narrows to 150 yards. It then turns abruptly to west for 1 mile, with an average width of ¼ mile, terminating in a flat ½ mile in extent, formed by a mountain stream emptying as a waterfall.

The bay affords secure **anchorage** 2 miles within its entrance in the basin that opens out just before reaching the narrows in 15 to 18 fathoms, soft bottom. The anchorage is 600 yards in diameter, with bold shores. Small vessels may pass through the narrows and anchor in mid-channel, ¼ to ⅜ mile beyond, in 9 to 10 fathoms, soft bottom. The width of this anchorage is about 400 yards.

The **southern point at the entrance** to Takatz Bay is the northern point of a high, wooded promontory forming the southeast side of the bay. Off this point are four bare rocks about 25 feet high. The two inner rocks lie close together, 400 yards from the point, with reefs bare at low water between. The two outer rocks lie ¼ mile eastward of the two inner rocks, with kelp between.

The promontory on the southeast shore of the bay also forms the northern shore of a bight, with a group of islands in its entrance. The bight has no anchorage, the water being very deep and bottom irregular. Off the southern point of the bight, and southward of the group of islands, is a rock, bare at low water, 400 yards from shore.

Point Turbot is the northern point at the entrance to Takatz Bay, and is marked by a large white rock about 75 yards off. There is a high waterfall about 2 miles northward of Point Turbot, visible from northward a considerable distance.

A **rock**, bare at low water and with kelp close around it, lies 300 yards southeastward of the large white rock close to Point Turbot.

A **rock**, awash at lowest tides and having no kelp, lies 150 yards from the northern shore and 350 yards northwest of the two inner rocks off the south point at the entrance to Takatz Bay.

A **sunken rock**, with 15 feet over it and marked by kelp, lies in the middle of the bay ¼ mile west-southwestward from the south point at the entrance.

DIRECTIONS, TAKATZ BAY.—The entrance is not visible until close in southward of Point Turbot. Give Point Turbot a berth of not less than ¼ mile when eastward of it, and pass in mid-channel between Point Turbot and the outer bare rocks off the south point at the entrance on a 262° true (SW ½ W mag.) course. Leave the two inner bare rocks off the south point at the entrance about 150 yards on the port hand, and then steer 236° true (SSW ¼ W mag.), favoring the southeast shore for about ½ mile to avoid a sunken rock in mid-channel. Then follow a mid-channel course for ¾ mile to the anchorage below the narrows. Small craft may pass through the narrows in mid-channel and anchor ¼ to ⅜ mile beyond them, but should not pass the first small islet ½ mile beyond the narrows, as the flat at the head begins there.

Kasnyku Bay, on the west side of Chatham Strait 4 miles northward of Takatz Bay, has deep water and no anchorage.

Cosmos Cove (chart 8243), on the west side of Chatham Strait 5½ miles northward of Takatz Bay and 2 miles southward of Kelp Bay, is 1¾ miles long and ¼ mile wide. A rocky, wooded islet lies close to the northern point at the entrance, with which it is connected at low water. A bare rock lies 200 yards southeast of the islet, and a ledge extends 150 yards farther southeastward. The entrance is south of the rock and ledge, and the cove affords anchorage with good shelter in 10 to 15 fathoms, soft bottom, for small vessels; the clear width of the anchorage is about 250 yards. The head of the cove is shoal for a distance of ¾ mile.

Kelp Bay (chart 8243).—Kelp Bay has its entrance on the western side of Chatham Strait, between Point Lull and South Point, 10½ miles southeastward of Fairway Island and 17½ miles northwestward of Point Gardner. It is 1¾ miles wide at its entrance, and the main bay 3½ miles long in a west-northwesterly direction. From the main bay three arms extend several miles farther. The water in the bay is deep and the shores abrupt and steep, but ledges extend from the shores in places, and there are several detached dangerous rocks. On the south side of the bay west of South Point are several low, wooded islands, south of which is The Basin, in the southeast corner of which is the best anchorage in the bay. Good anchorage may also

be found at the head of the Middle Arm, but it is somewhat contracted except for small vessels.

Pond Island, the largest of the islands in Kelp Bay, is about 1 mile in diameter, and there is a boat channel between it and South Point. The western side of the island should be avoided, as the bottom is irregular, and soundings of 6 and 8 fathoms were found ¼ mile from shore.

Crow Island is the westernmost and largest of a group of three islands which lie west of the north end of Pond Island. **Yellow Rock** lies off the northern end of this group. A sunken rock, with 12 feet over it and marked by kelp, lies a little over ⅜ mile east of Yellow Rock and the same distance north of the northwest point of Pond Island. Midway between this and Yellow Rock there is another sunken rock with 18 feet over it, and there is kelp between this second rock and Yellow Rock. A sunken rock, with 12 feet over it and marked by kelp, lies nearly ⅜ mile north-northeastward from the western end of Crow Island and nearly ½ mile westward of Yellow Rock.

Zubof Rock, awash at lowest tides, is 400 yards long north and south. Its northeast edge is ⅜ mile southwestward of the southwest side of Crow Island, and the same distance from the southwest shore.

There is a fair channel between Pond Island and Crow Island, which may be used at high water. The only directions that can be given for it are to keep near mid-channel and clear of kelp. There are two sunken rocks, with 12 feet over them and marked by kelp, in the channel. One is described above; the other lies in mid-channel in the narrowest part between the northwest point of Pond Island and Crow Island. The bottom shelves off for 200 yards from the east side of the island at the south end of the passage, and has kelp; the passage west of this island should be used with caution.

Point Lull is the northern point at the entrance to Kelp Bay, off which a sunken reef marked by kelp, extends southeastward. ⅝ mile. Between Point Lull and North Point is a narrow bight extending ¾ mile in a northwest direction. It is open southward, and affords temporary anchorage for small craft only.

North Point has a wooded islet about 100 feet high close to. A shoal, with 5 fathoms on it and marked by kelp, extends nearly ½ mile southeast from North Point. There are also two sunken rocks 350 yards from the north shore, ½ and ¾ mile northwestward of North Point. Two miles from North Point, on the north shore of Kelp Bay, is a prominent whitish cliff, 500 feet high.

Portage Arm, the northern arm of Kelp Bay, begins 3½ miles from Point Lull and extends west-northwest for 3½ miles. At its head is an extensive flat that runs through and at high water connects with Hanus Bay, Peril Strait. At 2¼ miles within the entrance to the arm there is a wooded island connected with the northern shore at low water, with several bare rocks close to its eastern end. A small vessel can find temporary anchorage a little north of mid-channel 400 yards westward of this island in about 10 fathoms, with scant swinging room; but this anchorage is exposed to southeast winds which draw through. A flat extends 300 yards from the south shore at the anchorage. The mid-channel is clear to the anchorage.

Middle Arm of Kelp Bay is separated from Portage Arm by Portage Point. The arm is clear from its entrance to its head, where there is a flat ½ mile in extent. It is about 5 miles in length in a westerly direction, curving slightly southward. The arm has good anchorage about 1 mile from its head in 22 to 25 fathoms, soft bottom. There is an indentation on the southern side about 1½ miles within the entrance, with a flat at its head and no anchorage.

South Arm of Kelp Bay extends 3½ miles in a southerly direction, curving slightly southeastward. It has no anchorage on account of the great depth of water, and there are no dangers except a sunken rock marked by kelp 200 yards off the east point at the entrance. A flat extends ¾ mile from the head of the arm. On the west side, within the entrance to the arm, are several landslides on the face of a steep hill which show from Chatham Strait.

Plover Rock lies off the entrance to South Arm 1¼ miles west of Yellow Rock. It is small, bare, and prominent, and has ledges on its north and south sides to a distance of 300 yards. A reef, with 12 feet over it and no kelp, lies ¼ mile southeast of Plover Rock; it is 350 yards long north and south, and there is no safe passage between it and Plover Rock. A rock, bare at low water and with little kelp, lies south-southwest of this reef and ⅜ mile south-southwestward of Plover Rock.

Entering Kelp Bay, chart 8243 is the guide.

Peril Strait and **Sitkoh Bay** are described under a separate heading beginning on page 202.

Point Gardner, the south extremity of Admiralty Island on the easterly side of Chatham Strait, is long, low, wooded, and marked by a light, and has two rocks 20 to 30 feet high 600 yards southward of the point. There is a prominent mound 400 feet high, ¼ mile back from the point, and 1¼ miles from the point is a prominent round hill 800 feet high. About 2½ miles back from the point the elevation reaches 1,000 feet. The water is good ¼ mile from the rocks off the point, but they should be given a berth of ½ mile on account of the tide rips frequently encountered here.

Wilson Cove, 8 miles northwestward of Point Gardner, is an open, shallow bight, about 1 mile long, with a width at its entrance of 2 miles. A flat extends ¾ mile from the northern end of the cove. On its southeast shore are two small wooded islands and foul ground with kelp extends ⅜ mile off this shore. In the entrance is an extensive reef covered at highest tides. Wilson Cove should be avoided, as it affords no protection as an anchorage except from easterly winds, and is very foul, bottom showing in 4 or 5 fathoms in places; but should it be necessary, stand in parallel to the southeast shore, passing southeast of the reef in the mouth of the cove; keep clear of the kelp on both sides, and anchor in 8 to 10 fathoms.

Whitewater Bay (chart 8246).—Whitewater Bay has its entrance on the eastern side of Chatham Strait between Point Caution and Woody Point, 15 miles northward of Point Gardner and 13 miles southward of Killisnoo Island. The bay is about 3 miles long, with an average width of 1 mile, and at high water connects by a narrow passage with a lagoon, bare at low water. Secure anchorage can be had near the head of the bay.

Point Caution is marked by **Lone Tree Islet** with a single dead tree, which lies 350 yards off the point. Foul ground and kelp extend over ½ mile westward and northwestward from the point. A ledge with 13 feet at its end and marked by kelp extends ⅜ mile northwestward from **Lone Tree Islet**; there is a rock awash at low water on this ledge ¼ mile from the islet. The width of the clear channel between this and the bare ledge off Neltushkin is over ½ mile.

Table Mountain, on the southern shore of Whitewater Bay, is 2,438 feet high and peculiarly eroded near the summit. It is the first prominent peak northward of Point Gardner.

Healy Rock lies ¼ mile from the southern shore of the bay and 1¼ miles eastward of Point Caution; it is low and bare and surrounded by ledges of small extent, marked by kelp. **Sand Point** is on the north shore ¾ mile northeast of Healy Rock; it is named from its formation and marks the entrance to the anchorage. **North Island,** low and wooded, lies close to the north shore ½ mile east-northeast of Sand Point.

Woody Point, the north point at the entrance, has a small, rocky, wooded islet 400 yards west of it. On the north shore, ¾ mile southeast of Woody Point, is the old native village of **Neltushkin.**

Foul ground marked by kelp extends ¼ mile from the north shore of the bay for a distance of 1¼ miles inside Woody Point. The most projecting is a bare ledge extending 600 yards west-southwest from the point westward of Neltushkin, and kelp surrounds the ledge to a distance of 250 yards.

Enter Whitewater Bay on a 144° true (ESE mag.) course with Healy Rock ahead. Pass ¼ mile northward of Healy Rock on a 127° true (E ½ S mag.) course, and when ¾ mile past it, head for North Island. Anchor in 10 fathoms, soft bottom, ¼ mile from North Island with Sand Point in line with Black Point.

Russian Reef lies 1 mile northwestward of Woody Point, the north point at the entrance to Whitewater Bay, and nearly on line from Point Caution to Distant Point. The reef extends ⅜ mile in a west-northwest direction and rises abruptly from very deep water. It shows partially at low water and is marked by kelp.

Chaik Bay (chart 8246), 19 miles northward of Point Gardner, extends in a northeasterly direction for 2 miles, with a width of 1½ miles; from its northeastern end two arms continue over 1 mile farther. The northern arm has good anchorage in 12 fathoms, sticky bottom, but is open southwest. The southern arm has considerable foul ground and should be avoided by strangers. A bare islet lies ⅞ mile westward of Rocky Point, the southern point at the entrance, and a ledge covered at half tide extends 600 yards northwestward from the islet. A bare ledge lies nearly ½ mile from the northern shore of the bay inside Village Point. A kelp-marked patch with 4¼ fathoms lies 600 yards west northwest of the wooded island in the middle near the head of the bay.

Approaching Chaik Bay from southward give the eastern shore a berth of about 1½ miles to clear Russian Reef. Enter the bay between the islet off Rocky Point and the bare ledge inside Village Point. When about ⅜ mile southeastward of the ledge steer 53° true (NNE mag.) with the islet off Rocky Point astern until about ½ mile from the north shore and the wooded island near the middle of

the bay is abeam. Then steer for the mouth of the northern arm and anchor in the middle of the arm in 10 to 12 fathoms, soft bottom.

Hood Bay (chart 8247) has its entrance on the eastern side of Chatham Strait between Distant Point and Killisnoo Island, where it is 4 miles wide. It has a general east-southeasterly direction from its entrance, curving to about east-northeast for 7 miles, and then divides. The northern arm ha a length of 2½ miles and a flat ½ mile wide at its head. The southern arm has a length of 3½ miles and is free from mid-channel dangers inside its entrance. There is anchorage in the north arm in 15 to 20 fathoms, and near the head of the south arm in 18 to 25 fathoms, muddy bottom and good protection.

Distant Point is the southern point at the entrance to Hood Bay. Directly behind it are two mountains which lie between Chaik and Hood Bays. The larger mountain is about 2,300 feet high and rounded on top; 2½ miles southward of Distant Point a spur of this mountain runs toward the water and terminates in a whitish cliff 800 feet high.

A **rock**, with 14 feet over it and marked by kelp, lies ⅝ mile northward of Distant Point and ⅓ mile offshore. At ⅞ mile northeast of this rock there is a bare ledge ¼ mile offshore.

Three-fourths mile northward of the preceding bare ledge and ½ mile off the northeast shore of Hood Bay is the easternmost reef of a chain of rocks and reefs 2 miles in length. This easternmost reef is bare at half tide.

About 4 miles inside Distant Point, where the bay narrows to less than ¾ mile, there are two bare rocks nearly ¼ mile from the north shore. A ledge, bare at low water and marked by kelp, extends 400 yards south-southwest from the rocks. The better channel is southward of the ledge and has a clear width of ¼ mile. The bight in the northern shore ½ mile westward of this ledge is full of rocks; there are several shacks at the head of the bight.

At 1⅜ miles within the bay from this ledge there are two **rocks** bare at low water 400 yards off the northern shore. They lie close together and ½ mile west-northwestward of the south point at the entrance to the southern arm.

A **ledge** bare at low water extends 300 yards south from the small, bare, rocky islet on the north side in the entrance to the southern arm, 250 yards south of the point dividing the arms.

At ¼ mile within the entrance to the northern arm there is a projecting point on the western side, from which a **ledge** bare at low water extends 250 yards northeastward.

Killisnoo Harbor (chart 8285).—Killisnoo Harbor lies on the eastern side of Chatham Strait and on the northeast side of the eastern end of Killisnoo Island. It is about 1 mile long east and west, and nearly ½ mile wide but the anchorage is reduced by shoals extending from the shores. The 3-fathom line is about 300 yards from shore on the north and northeast sides of the harbor, and there are many rocks inside this depth.

Lone Rock, bare at low water, lies ¼ mile eastward of the light on the ledge at the southeast end of Killisnoo Island. It is surrounded by kelp and is marked on its western side by a buoy. The bottom is foul and there is considerable kelp between the rock and the eastern shore, and there is no safe channel between. This foul ground is contained between the bearings 82° true (NE ½ E mag.) and 144° true

(ESE mag.) from the rock; sunken rocks with 6 to 9 feet over them lie about 350 yards eastward of Lone Rock between these bearings.

Killisnoo Island is wooded and about 300 feet high; **Point Samuel** is its western end. A ledge, well bare at low water, extends about 125 yards off the southeast end of Killisnoo Island, and is marked near its southeast edge by a light. There is kelp close-to outside the light, and the light should not be approached closer than about 100 yards.

Table Island, about 30 feet high, sandy and grass covered, lies ½ mile southeast of Killisnoo Island. It is surrounded by reefs to a distance of nearly ¼ mile. On its northwest side the 3-fathom curve is fairly close to the island, but kelp extends out 300 yards into 6 and 8 fathoms.

Sand Island, 1 mile eastward of Table Island, is about 10 feet high and is the northwest end of a chain of reefs, 2 miles long, parallel to the northeast shore of the bay. There is a straight but narrow channel between these reefs and the northeast shore. There is a bar with 6 to 10 fathoms over it between Sand Island and Table Island.

Killisnoo is a post office and native village on the north side of the east end of Killisnoo Island. The Alaska Fish Salting and By-Products Co. has a large plant for the manufacture of herring oil and fertilizer. A government school for natives is located here. There is regular communication with Juneau and Sitka by means of small local vessels. The wharf has a depth of 25 to 30 feet.

The Anchorage is in mid harbor with the light off the east end of Killisnoo Island in line with the eastern side of Table Island, and the north side of Killisnoo Island open a little north of the end of the wharf in 14 to 15 fathoms. The bottom is generally hard, but on the ranges given is mud. The harbor is somewhat exposed to southeast and southwest gales, but no considerable sea makes into the anchorage.

The Tidal Currents at Killisnoo are irregular, but the averages show that the current on the last half of the falling tide and the first part of the rising tide sets from Hood Bay westward through the harbor and northern channel, and that the current on the second half of the rising tide and first half of the falling tide sets eastward through the northern channel and the harbor into Hood Bay. To find the approximate time of slack water add 3 hours to the Sitka time of the higher high waters and add 2 hours to the time of all other tides.

The current follows the channel, and the velocity is not important except in the narrow part of the northern entrance. The current at the wharf has much less velocity than in the channel; sometimes, however, an eddy will be found, but it does not interfere materially with making a landing.

Channels.—The **southern channel** leads between Table and Killisnoo Islands and between Lone Rock buoy and the light near the east end of Killisnoo Island.

The **northern channel** leads between Killisnoo Island and Kenasnow Rocks and between the island and Admiralty Island. For some distance westward of the wharf the channel is very narrow, with reefs on both sides. A rocky bar extends across the channel just westward of the wharf, over which there is a depth of 4 fathoms in the channel. In summer kelp extends entirely across the channel. At the eastern end of the channel a light is placed to mark the north end of the rocks

which bare on the south side of the channel. The channel is north of the light. At 200 yards west of the light a spur makes out from the north side, with about 15 feet nearly 150 yards from shore. The kelp is useful in defining the channel. The least depth in the channel is about 4 fathoms.

Chart 8285 is the guide for both channels.

Kootznahoo Roads is on the northwest side of Killisnoo Island and forms part of the northern channel leading to Killisnoo.

A ledge, mostly covered at three-quarters flood and surrounded by kelp, extends about 300 yards off the north side of the western end of Killisnoo Island. The northern end of the ledge is marked by a buoy. From the head of the bight in the north side of Killisnoo Island, ½ mile eastward of the buoy, a ledge makes out nearly 350 yards.

Kenasnow Rocks are an extensive ledge ½ to ⅜ mile offshore southward of Angoon. Portions of the ledge are always above water, and it is surrounded by heavy kelp, especially on its inshore side. There is a channel between it and the shore, the latter being fringed with kelp for some distance. The southeast end of the ledge is ¾ mile north of Killisnoo Island.

Angoon is a native village on the eastern shore 1¾ miles northwestward of Killisnoo Island and ½ mile back from Kenasnow Rocks.

Kootznahoo Inlet.—This inlet (chart 8247), comprising an area of about 15 square miles, is an intricate group of narrow passages, lagoons, and bays on the eastern shore of Chatham Strait 2¾ miles northward of Killisnoo Island. It is full of rocks and reefs, and through the narrow passages the tidal currents rush with great velocity. The navigation of Kootznahoo Inlet is such that it should not be attempted except by small craft of short length and ready turning qualities, and then only at slack water and with local knowledge. Fishing vessels are the only ones that navigate the inlet.

The entrance is ½ mile wide between Danger Point and Kootznahoo Head. It extends eastward 1 mile, gradually narrowing, to Turn Point, where it divides into three arms; the southernmost continues in an easterly direction 2 miles to Favorite Bay; the westernmost extends northward, west of the islands, for 5 miles to Mitchell Bay; the middle arm, also extending northward, leads among the islands, is obstructed at its southern entrance and navigable only for small craft. The lagoons between the islands eastward of the western channel, southward of Mitchell Bay and northward of Favorite Bay, are full of rocks and reefs, and not navigable except for small craft.

From **Danger Point**, the south point at the entrance, a ledge bare at low water extends 300 yards west-northwestward. From its entrance the inlet is free from obstructions until Village Rock is reached. **Village Rock** is a large low-water ledge extending toward Turn Point halfway across from the native village of Angoon on the south side; large swirls occur here, caused by the great velocity of the tidal currents.

Eastward of Village Rock the south shore is clear for nearly ½ mile. The north side is obstructed by a ledge marked by kelp at slack water, which extends ⅜ mile east-southeastward from Turn Point and terminates in **Rose Rock**, covered at high water and marked

by a spindle placed by local interests. In mid-channel between Rose Rock and the southern shore is a shoal with 8 to 12 feet over it.

The passage to Favorite Bay extends nearly 2 miles east-southeastward from Rose Rock, with a varying width of ¼ to ⅛ mile. It is obstructed at its western end by a series of rocks, bare at low water, which begin near the south shore ¼ mile east of Rose Rock and extend eastward in a curve, nearly reaching the north shore, to the south shore again in a distance of ⅝ mile. There are deep passages among these rocks. The eastern end of the passage is obstructed by a rock in mid-channel ¼ mile eastward of the fishing camp on the south shore and ¼ mile from the entrance to Favorite Bay.

Favorite Bay has anchorage near the south shore anywhere westward of a high bluff, marking the end of the flat that extends 1 mile from its head, in 10 to 17 fathoms. The bay is used as a fishing ground for herring.

The western channel, from the spindle on Rose Rock, turns sharply westward along the north side of the reef making out from Turn Point, between it and an extensive ledge on the north side of the channel, for ¼ mile to the south end of Stillwater Anchorage.

Stillwater Anchorage is 1¼ miles long from Turn Point north-northeastward to Pillsbury Point, and 300 to 600 yards wide, with general depths of 16 to 20 fathoms. West of Pillsbury Point a short arm makes northward ½ mile.

From Stillwater Anchorage the channel leads close to an islet on the east side, between it and a ledge extending 200 yards south of Pillsbury Point. The channel then narrows to 200 yards, with reefs on both sides, and extends northward for ½ mile to Point Bridge, where it passes between a reef on the west side and a bold bank on the east side. The channel then has a north-northeasterly direction for ¾ mile, with a width of less than 200 yards and bold shores, and then widens to ¼ mile and continues in the same direction 1½ miles, and then turns to about northeast for 1¼ miles to North Point, northeast of which is Mitchell Bay. At ¼ to ¾ mile southwest of North Point the channel is narrowed to 100 yards between a system of high-water islets on the east side and extensive ledges on the west side which extend southwestward from North Point.

Mitchell Bay is 4½ miles long in a northeasterly direction and ½ to 1½ miles wide. It connects at its southwest end with a lagoon so full of rocks, reefs, and shallow water that soundings were considered unnecessary. At its southeast end it is connected by Davis Creek with Kanalku Bay and Lighter Creek. Several islands lie in the bay 1 mile from its southwest end, and the water is foul between them and the southwest end of the bay. From its entrance at North Point the channel follows the northwest shore for 1 mile, where it passes between it and the northwest island (called Diamond Island) in the southwest part of the bay. Beyond Diamond Island, Mitchell Bay is clear, and has a general depth of 20 fathoms near Diamond Island, decreasing to 10 fathoms at its northeast end.

Davis Creek extends south from Mitchell Bay for 2 miles, with a width of ⅛ mile, and then turns to east-northeast and widens into Kanalku Bay. **Lighter Creek** makes southwestward from its west side ½ mile from its north end, and has depths of 1 to 3 fathoms. Davis Creek is very foul. At its north entrance a ledge, partly bare at low water, extends northeast from the western shore, inclosing Passage

Islet and nearly closing the channel. At ¾ to 1 mile southward of the entrance to Lighter Creek a ledge, mostly bare at low water, extends halfway across the channel from the eastern side. At the south end of Davis Creek is Stone Islet; an extensive ledge crosses the channel at this point, with a narrow passage through.

Kanalku Bay is a clear open basin with depths of 6 to 10 fathoms. In the bay are two islands and at its head two large streams and a flat ½ mile wide. On the south side are extensive coal croppings and a deposit of marble.

The Tidal Currents have great velocity in Kootznahoo Inlet, and it should be navigated at slack water, the safest condition being low-water slack. The flood current at the entrance sets in nearly parallel to the north shore, and so continues until it reaches Village Rock, where it divides, one part going northward around Turn Point and the other continuing eastward south of Rose Rock, where it again divides. One part continues east into Favorite Bay, while the other turns short around the rock and divides again, one part going north and the other following the western channel. The velocity in Kootznahoo Inlet at the time of strength is about 4½ knots, but may at times be much greater.

The currents continue to run from 1 to 1½ hours after high and low water at Killisnoo, or even longer. Slack water will be found at Village Rock, Pillsbury Point, Point Bridge, and North Point from 1 to 1½ hours after high and low water at Killisnoo. Slack water at the north end of Davis Creek occurs ½ hour after high or low water in Mitchell Bay. Vessels rounding Rose Rock at slack water can carry slack water all the way to Mitchell Bay.

At Village Rock the currents have a velocity of 5 to 8 knots, at Point Bridge as high as 10 knots, and at Passage Islet as high as 7 knots. Rapids begin at Village Rock and continue until well past Rose Rock.

From Pillsbury Point to Point Ridge the current is very swift, probably reaching 10 knots, with much boiling and swirling, the worst place being at Point Bridge. This can be passed only at slack water, which lasts only a few minutes and occurs about 1 hour 50 minutes after high and low water at Killisnoo.

Through all the narrow channels leading into the various bays the currents have great velocity, and they should not be attempted in any kind of a boat except at slack water.

The navigation of Kootznahoo Inlet is such that it should not be attempted by strangers. A pilot can be obtained at Killisnoo.

Peril Strait and **Sitkoh Bay**, on the southwestern side of Chatham Strait, are described under a separate heading, beginning on page 202.

Basket Bay (chart 8283), on the west side 11 miles northward of Point Hayes and 6 miles southward of South Passage Point, is 1⅓ miles long and ⅜ mile wide at its entrance, narrowing slightly at its head, where there is a flat 250 yards wide and a large stream. The bay is exposed to southeast, the bottom is rocky, depths 24 to 40 fathoms, and is not recommended as an anchorage. The mid-channel course up the bay is west and is clear; a reef and some detached rocks extend nearly 350 yards from the south shore, just outside the entrance.

Tenakee Inlet, on the west side of Chatham Strait between **South Passage Point** and **East Point**, is 2½ miles wide at its entrance, and

has a general southwesterly direction for 10 miles and then westerly for 25 miles, narrowing near its head to ½ mile. At its head there is a flat ¾ mile in extent, and on the south shore, 4 to 7 miles from its head, are three bights filled by flats. At 1¾ miles from the head of the inlet there is a portage of about 50 yards at high water connecting with Port Frederick in Icy Straits. The depths in the inlet are great and the dangers easily avoided. There are a number of bays on the south side affording anchorage.

A small islet off South Passage Point is marked by a light. A rock, awash at lowest tides and surrounded by kelp, lies ½ mile northwestward of the light in the direction of East Point. The rock is marked by a buoy.

There is a cannery and wharf in a bight on the northwesterly side of Tenakee Inlet nearly 5½ miles in from South Passage Point and 4 miles northeastward of Tenakee post office. The wharf has a depth of 21 feet along its face.

There is a light on a small islet close to the northwesterly shore about ¾ mile eastward of the wharf at Tenakee.

Tenakee is a wharf, post office, and health resort at the warm springs on the northerly side of Tenakee Inlet about 9 miles inside the entrance. It has regular communication by small craft with Juneau.

Two rocks, covered at high water, lie nearly ¾ mile southward from Tenakee and another similar rock lies ½ mile west-northwestward of these rocks.

On the south side, 12 miles within the entrance and 4 miles south-southwestward from Tenakee, is a bay 5 miles long in a southwesterly direction and ½ mile wide. On its southeast side is an entensive flat surrounding a high-water island. At its head there is a flat ¾ mile in extent and a small stream. There is anchorage 1 to 1¾ miles from its head in 15 to 20 fathoms.

At 3 miles west-northwest of this bay is a small bay and inlet the entrance to which is clear; a flat extends ½ mile from the head of the inlet. It affords anchorage for small vessels in 15 to 17 fathoms.

Two small rocks, covered at half tide, lie ¾ mile from the north shore of the inlet and 7½ miles westward of Tenakee. In passing them the south shore should be favored somewhat.

On the south side of the inlet, 10 miles westward of Tenakee, there is a bay 3 miles long and ½ mile wide. A flat extends ¾ mile from its head, and there is a rock, covered at high water, near the middle of the bay 1½ miles inside the entrance. The depths are 25 to 30 fathoms, soft bottom, between the rock and the flat, a distance of ¾ mile.

At 2½ miles farther westward is a bay 2½ miles long and ⅜ mile wide. From the west point at the entrance a reef, covered at half tide, extends northeast nearly ½ mile, leaving a clear channel between the reef and south shore ¼ mile wide and 12 fathoms deep. The depths within the bay are 15 to 22 fathoms, muddy bottom, affording secure anchorage. A flat extends ¾ mile from its head.

Anchorage may be made at the head of the inlet near the sand flat in 25 to 30 fathoms, and in the four bays described above; otherwise there is no anchorage in the main inlet.

In Tenakee Inlet, south of Tenakee post office, the velocity of either flood or ebb stream is 0.8 knot.

Freshwater Bay.—This bay has its entrance on the west side of Chatham Strait between East Point and North Passage Point; it is 2 miles wide, and extends 11 miles westward, terminating in a sand flat with a large stream. There is a bare rock about 8 feet high nearly ½ mile from the north shore 3½ miles inside North Passage Point, and two islands in mid-channel farther westward; a rock, bare at low water, is reported ¾ mile westward of them. The main bay has no anchorages, but small vessels may find temporary anchorage at the head of the bay or off the flats at mouths of streams, of which there are several. Pavlof Harbor is the only desirable anchorage in the bay for vessels.

North Passage Point, the north point at the entrance to Freshwater Bay, is long, low, level, and wooded, and is distinctive from other points in the vicinity, which are all high.

Wachusett Cove is a small bight on the south side of Freshwater Bay, 2 miles west of East Point. The cove is almost filled with a flat and there is a small stream at its head. A fair-weather anchorage may be made between the points at the entrance in 8 to 10 fathoms.

Pavlof Harbor, 1½ miles west of Wachusett Cove, is ⅓ mile wide and about the same long. A large stream enters the southwest corner. A reef covered at half tide extends 90 yards from the east point at the entrance, and the entire east side of the bay is bordered by a flat 250 yards wide. A pinnacle rock, covered at half tide, lies 220 yards from the west side halfway up the bay. Anchorage may be made outside the rock in about 15 fathoms; also in the middle between the rock and the southeast shore, the clear anchorage being 300 yards wide, in 10 to 12 fathoms, bottom sand and rocks. The shelter is good, and the harbor is easily entered.

Cedar Cove, on the south side, 1¼ miles west of Pavlof Harbor, affords shelter for small craft, but its entrances are very narrow and foul.

Iyoukeen Cove lies close north of the entrance to Freshwater Bay, from which it is separated by a long, narrow, wooded peninsula, terminating in North Passage Point. It does not afford shelter except from offshore winds, but can be used temporarily by anchoring about ⅓ mile from the south shore in 23 fathoms.

Gypsum is a wharf, post office, and mine at the head of the cove. The face of the wharf is 100 feet in length, and has a depth of 30 feet.

False Bay, 5 miles northward of Iyoukeen Cove, is of no importance.

Point Augusta, on the southwest side of Chatham Strait at its junction with Icy Strait, is marked by a light.

Hanus Reef is a dangerous reef about ¼ mile in extent which lies 5¾ miles northwest of Point Augusta, at the junction of Chatham Strait and Icy Strait. The highest part of the reef is bare at half tide. At times the tidal current has a velocity of 2 or 3 knots over the reef. The reef is marked by a buoy placed about 100 yards north-northeastward of the highest part.

Icy Strait is described under a separate heading on page 226.

Square Cove, on the northeast side of Chatham Strait 7 miles eastward of Point Augusta, affords anchorage for small craft with protection from southeast winds. The cove is about 500 yards in length and of half that width, and there is a depth of about 3 fathoms

within 200 yards of its head and deeper water farther out. There are no dangers. A stream enters at each end of the sand beach at its head, the eastern one forming a cascade. The bight 2 miles southeastward of Square Cove and on the north side of Point Hepburn affords anchorage for small craft in 5 fathoms with shelter from southeast winds. A stream enters the head of the bight.

On the east side of Chatham Strait, 1½ miles northward of Point Marsden and close southward of the entrance to Hawk Inlet, is a small cove (of Hawk Inlet, chart 8300) with good anchorage, except with northwest winds, for small craft, in 9 to 10 fathoms. The clear width of the anchorage is about 400 yards. A flat extends 400 yards from the head of the cove. From the southwest point at the entrance a reef, bare at half tide and marked by kelp, extends nearly ¼ mile northwest. A ledge, covered at half tide and marked by kelp, lies in the middle at the entrance. There is a deep channel on either side of the ledge, but the best is on its northeast side. The anchorage is in mid-cove about 300 yards southeast of this ledge.

Hawk Inlet (chart 8300, insert) has its entrance on the east side of Chatham Strait, 10 miles eastward of Rocky Island. For a distance of 5 miles from its mouth it has a north-northwesterly direction and a width of ½ mile. It then contracts to a width of ¼ mile and changes to a northerly direction, terminating in a basin nearly 1 mile in diameter. Five small streams enter the basin, their débris forming extensive mud flats along its shores. Nearly in the middle of this basin anchorage can be had in 6 to 7 fathoms.

The entrance to Hawk Inlet is narrowed by ledges, bare at low water, which extend 350 yards southeastward from the northwest point at the entrance, and kelp extends outside the ledge to a distance of ¼ mile southward and eastward from the point. The limits of the kelp and dangers are marked by buoys. On the southeast side of the entrance are two small islets in the mouth of a small cove, dry at low water. The outermost islet is marked by a light.

About ¾ mile up Hawk Inlet on its east side two streams enter, forming an extensive mud flat, extending two-thirds the distance across, leaving a channel 200 yards wide, with 7 fathoms in the middle, between it and the west shore. Here the tidal currents have considerable velocity, causing swirls. The outer point of the shoal is marked by a light. There is a cannery and wharf on the eastern side, 2½ miles inside the entrance. The greatest depth in Hawk Inlet, 45 fathoms, is off the cannery.

In entering Hawk Inlet pass 100 to 250 yards southward and eastward of the buoys near the entrance, and 100 yards westward of the light marking the point of the shoal. Favor the west shore for ¼ mile past the light and then head for the cannery.

Funter Bay (chart 8302, insert) lies on the east side of Chatham Strait at its junction with Lynn Canal, 10½ miles southeastward of Point Retreat and 5½ miles north-northeastward of Rocky Island. It is the best and most convenient anchorage in its vicinity. The bay is 2 miles long in a north-northeasterly direction, and ¾ mile wide at the entrance, expanding slightly inside. There is a small stamp mill on the southeast side of the bay, and some mining development has been done. A cannery and wharf are on the northwest side of the bay; this is the post office of **Funter**, and it has regular communication with Juneau. Anchorage can be made off the stamp mill

and also about ¼ mile south of the cannery, with the north end of Gauge Island bearing about 122° true (E mag.).

The southeast point at the entrance has several small islands near it, with a clear channel between. **Station Island**, the largest, is 78 feet high and wooded; at low water it is joined to a small islet southward, 40 feet high. **Rat Island**, 400 yards north-northeast of Station Island, is 17 feet high and bare; a ledge, bare at low water, extends ⅛ mile west-northwest from it.

Clear Point, the northwest point at the entrance, is marked by a light. **The Kittens**, two small islands ¼ mile from shore, lie ¾ mile west of Clear Point. **Naked Island** lies 1⅛ miles westward of Clear Point and ½ mile offshore, with deep water between; it is marked by a light. North Ledge, awash at highest tides, extends ¼ mile northwest from Naked Island.

Four islets lie in Funter Bay between Clear Point and the head. **Bare Island**, the first from Clear Point, is 13 feet high. **Curlew Ledge**, bare at low water, lies 250 yards south-southeastward of Bare Island, and a shoal, with 11 feet over it, extends 100 yards east-southeastward from the ledge, and is marked at its southeast end by a buoy. **Gauge Island**, the second islet, is 72 feet high and wooded; it is surrounded by ledges, which extend mainly in a south-southeasterly direction 150 yards. **Star Rock**, a small pinnacle bare at lowest tides, lies 120 yards north of Gauge Island. **Ledge Island**, the third islet, is 5 feet high; ledges, bare at low water, extend 200 yards south-southeast from it. The fourth islet is the largest and lies at the head of the cove; it is connected with the main shore at low water.

In entering Funter Bay, pass 250 yards or more southeastward of Clear Point and Curlew Ledge, and keep in mid-channel between Bare and Gauge Islands.

Courses and distances, Cape Decision to Frederick Sound, are given in the table of courses on page 24, and from Peril Strait to Point Retreat, in the table of courses on page 25.

COAST FROM CAPE OMMANEY TO SITKA SOUND.

From Cape Ommaney the western coast of Baranof Island trends west-northwestward to Biorka Island, a distance of 50 miles. This coast has not been surveyed, and an accurate dscription is not available.

Cape Ommaney is described on page 167.

From Cape Ommaney to a little above Snipe Bay, a distance of 20 miles, the coast is irregular and bold, with mountains rising to heights of 2,000 to 4,000 feet. The shore is of gray, storm-swept rock. Above Snipe Bay the coast, although still very irregular, is less forbidding, and the shore is of brown and gray rock. The mountains in the background terminate at the coast in long, low points from 200 to 800 feet high.

Bobrovoi Point, about 2½ miles west-northwestward of Cape Ommaney, is the southeast point at the entrance to Larch Bay.

Larch Bay is a large open bay about 2½ miles wide at the entrance and about the same long; on none of the charts is an anchorage shown. There are low depressions between Larch Bay and Chatham Strait.

Sealion Rock, about 7½ miles above Cape Ommaney and directly off the entrance to Puffin Bay, is a cluster of four dark rocks, 30 to 40 feet high, and several smaller outlying rocks close-to. The central rock is pyramidal in appearance with steep sides; the others are somewhat more massive. The depths are good on both sides of the rocks, but it is better to pass southward of them in entering Puffin Bay.

Puffin Bay, the entrance to which is directly back of Sealion Rock, 7½ miles above Cape Ommaney, is about 2 miles in length in a northerly direction, and apparently has good depths throughout. Several rocky islets lie close to the points on both sides of the entrance. On the east side of the bay at its head is a small, circular bight ½ to ¾ mile in diameter, which affords anchorage for small craft in 3 to 4 fathoms, soft bottom. The entrance to the bight is about 100 yards wide and has a depth of 7 fathoms. From the entrance the depths shoal regularly to the mouth of a small stream at the head of the bight. During southerly gales in winter williwaws blow down from the surrounding hills with considerable force.

Big Branch Rock is a single, massive, round-topped rock about 40 feet high; it lies 1⅞ miles northwestward of Sealion Rock and 2 miles east-southeastward of Redfish Cape.

Redfish Cape is a narrow peninsula appearing as a comparatively low, wooded, hummocky ridge parallel to the coast; it is the only apparent low ridge in the vicinity. Coming from northward, a short distance above Redfish Cape, a white, conspicuous cliff is seen in the midst of the timber. A chain of barely separated wooded islets extends ½ mile southeast from the end of the cape; the southeasternmost one is conical and wooded; outside and close to it are two large bare rocks which appear as one. Between Redfish Cape and Big Branch Rock is the entrance to Little Branch Bay, Big Branch Bay, and Redfish Bay.

Little Branch Bay extends northeastward about 2½ miles and is nearly 1 mile in width. Shoals are indicated on its southern shore, and some islets on its northwest side. It probably affords an anchorage, but no directions can be given. A patch of foul ground that breaks in heavy southwest weather lies about ½ mile off the entrance and ¾ mile east-southeast of Redfish Cape.

Big Branch Bay extends in a north-northwesterly direction nearly 5 miles, and is about ½ mile in width, expanding somewhat at its head; near the middle of the bay a sunken rock is noted. Several wooded islands separate the lower end of this bay from Redfish Bay.

Redfish Bay (chart 8262) has its entrance between Redfish Cape and Beavertail Island, the latter ⅝ mile northeast of the former. From its entrance the bay extends in a general north-northwesterly direction for 3 miles, narrowing in places to 100 yards. There are numerous dangers and caution is required in entering. There is secure anchorage for small vessels, known as **Ten Fathom Anchorage**, or **Keough Anchorage**, about 1 mile northward of Redfish Cape, and another anchorage at the head of the bay.

Directions, Redfish Bay.—The entrance is difficult to distinguish, but the following may be useful:

On arriving in the vicinity, a high, sharp, pyramidal peak is seen in the back mountain masses, apparently higher than the surrounding

peaks, and northward are a cluster of four peaks. Bring the first-mentioned sharp peak to bear 52° true (NNE mag.) and run for it. As the land is approached, the southernmost island at Redfield Cape will be seen ahead.

Give the outer rocks at Redfish Cape a berth of 300 yards to avoid Redfish Break, nearly always visible, which lies a little less than 200 yards southeast of the outer rocks; but do not give the cape too wide a berth or the foul ground, which breaks in heavy southwest weather, ¾ mile east-southeastward of the cape, may be encountered. After rounding the outer islets keep the port shore well aboard. The first danger is a kelp patch projecting a few yards from the wooded islets; the next is a 5-fathom kelp patch, 300 yards off the western shore.

If going to Keough Anchorage (Ten Fathom Anchorage), pass eastward of the 5-fathom patch, round **One Tree Rock** (single stub on it) at a distance of about 75 yards, and enter the anchorage in mid-channel on about a 64° true (NE by N mag.) course.

If going to the anchorage at the head of the bay, pass about 80 yards westward of Reef Shoal, which projects 300 yards southward toward the channel from Reef Rock. The channel is between Reef Shoal and Viking Rock (sunken), and great care must be exercised here, as the channel is only about 150 yards wide; but the dangers are marked by kelp. One-half mile from Reef Rock are the First Narrows, westward of Midway Island, between it and Bush Rock. The channel here is about 200 feet wide, though from shore to shore it is 300 feet. There is plenty of water, but care must be exercised in the steering.

Five-eighths mile from the First Narrows are the Second Narrows, 170 feet wide from bank to bank, but on account of the overhanging trees, seemingly scarcely 100 feet. After emerging from the Second Narrows a bay makes westward; the course to the anchorage, however, is northward, passing eastward of Overhang Point. Anchor in mid-channel ¼ mile from the head of the bay in 6 to 8 fathoms.

From Redfish Cape to Point Lauder, 18 miles, the coast trends nearly northwest and is bold, with several small bays and coves. Four of these are named, respectively, Byron Bay, Snipe Bay, Sandy Bay, and Close Bay.

Byron Bay is about 1½ miles long in a north-northwesterly direction to its head, where a large creek enters. Close to the northwesterly shore, near the head, is a small wooded island, above which small craft can find indifferent anchorage.

Snipe Bay is ⅜ mile wide at the entrance, deep and clear, and is about 2¾ miles long in a 35° true (N ½ E mag.) direction. Inside the entrance on the southeast side is a sheltered bight, but the depths are too great for anchorage. At the head of the bay are two short branches; the northwesterly one affords fair anchorage, but is exposed to southerly weather.

Sandy Bay is 2 or 3 miles long in a northerly direction and has bluff shores. It probably does not afford anchorage.

Close Bay is said to afford no anchorage, except possibly a temporary one for small craft near the entrance.

Point Lauder, the southeast point at the entrance to Whale Bay, is represented as surrounded by rocks and islands close-to, which ex-

tend northward more than 1 mile to the entrance to Still Harbor and about ½ mile offshore.

North Cape, 5 miles west-northwestward of Point Lauder, is the western point at the entrance to Whale Bay and appears to be a small island close to the point of the mainland, with a number of islets close to the shore on either side of it.

Whale Bay.—This bay extends in a general northerly direction about 6 miles, with an average width of more than 3 miles. On its east side are several indentations affording anchorages, and at its head are two branches, both extending northward. Great Arm, the easternmost branch, is 8 or 10 miles in length, and from its head is said to afford easy portage to Gut Bay on Chatham Strait.

Still Harbor, at the entrance to Whale Bay about 1 mile northward of Point Lauder, is about 1 mile long in a southeasterly direction and ¼ mile wide. At the head of the harbor is a broad flat and a stream from a lake. The harbor affords excellent anchorage for small craft northward of two small islets near the head of the bay. Without local knowledge it should be entered with caution, favoring the northeasterly shore for about the first mile to avoid a rock, awash at low water, which lies off the southwesterly shore well inside the entrance, and then favoring the opposite shore in order to pass southwestward of a sunken rock with 10 feet over it.

Port Banks, supposed to be the best anchorage in Whale Bay, is on the eastern shore about 3 miles above Still Harbor. About 1½ miles south-southwestward of Port Banks a rocky islet, some rocks, and shoal water are noted about ¾ mile offshore. Due caution should be observed in passing. The entrance to Port Banks is well marked, though somewhat contracted, by an islet near the southern headland, with a smaller islet inshore of it, and which apparently leaves a passage a little more than ¼ mile wide, with about 7 fathoms. A sunken rock, on which there is a break at low water with a moderate swell, is reported to lie in about the middle of Whale Bay off the entrance to Port Banks. A reef, bare at low water, extends about ¼ mile from the west point at the entrance, and a rock, bare at low water, lies eastward of the islet in the entrance, nearer the islet than the eastern shore. Inside the port the chart notes 15 and 13 fathoms. The harbor extends nearly 1½ miles in a southeasterly direction and is about ½ mile wide. In entering Port Banks pass eastward of the small islet and rock in the entrance and favor the eastern shore. Dixon anchored in 22 fathoms, muddy bottom, 200 or 400 yards northwest of a small islet nearly in the middle of the port at its head.

Necker Bay, broad and open southwest, lies northwest of North Cape. The western headland of this bay is formed by the **Yamani Islets,** named by the Russians, the term meaning "full of pits and holes"; good anchorage for small craft can be had northward of the islets. In the mouth of Necker Bay near North Cape are **Guibert Islets,** a cluster of four principal islets and several smaller ones, bare except for tufts of grass on their ragged points.

Westward of Yamani Islets are **Slate Islets,** small and numerous.

From this point to Biorka Island is an archipelago called **Necker Islands.** An inlet surrounding a large island at the northeast part of this group is called **Crawfish Inlet.**

(chart 8281) has its entrance from sea between Biorka Island and Cape Edgecumbe. It extends in a northerly direction about 14 miles, with a width east and west of 7 to 10 miles. The east and north shores are fringed with numerous islands and rocks and indented by bays and inlets. At its north end the sound connects with several bays and estuaries extending northward, and with Olga Strait, which is part of a navigable inland passage connecting Sitka Sound through Neva and Peril Straits with Chatham Strait. The shores are everywhere wooded, rendering it difficult to distinguish from a distance the wooded islets when they are on with the land, which usually rises rapidly a short distance from the sea, culminating in broken mountains. The islands are mostly small, low, and more or less wooded.

Mount Edgecumbe, on Kruzof Island, is the prominent landmark for Sitka Sound and is 3,467 feet high. From any point seaward it is easily distinguished by its isolated position, its flat top, its peculiar streaked appearance, and its reddish color. The upper part is a bare volcanic cone, usually snow-clad. Extending down the sides of the cone are numerous deep gullies or ravines, in which the snow lies until late in the summer, giving it a peculiar streaked appearance. The crater is from 300 to 400 feet deep.

Biorka Island, the southeast point at the entrance to Sitka Sound, is low, wooded, and has numerous rocky cliffs. East of Biorka Island are the numerous Necker Islands.

Biorka Reef lies 1¼ miles 268° true (SW by W ⅛ W mag.) from the northwest end of the islet close to the western end of Biorka Island. It is a sunken rock, nearly awash at lowest tides, with deep water around it, and breaks in moderate weather; it has no kelp. The channel between the reef and Biorka Island is 1 mile wide, clear, and practicable for vessels of any size.

Symonds Bay (chart 8237) is the eastern cove indenting the north side of Biorka Island, and is sometimes a convenient anchorage for small vessels deterred from entering the sound by thick weather. It is ¾ mile long, ½ mile wide at the entrance, and ¼ mile wide at its head. An islet lies close-to north of each point at the entrance. The depths range from 20 fathoms at the entrance to 5 and 6 fathoms at the anchorage near the head. A sunken rock, with 3 feet over it and marked by kelp, lies 200 yards from the western side at a point halfway up the bay. The bay is open north-northwestward, but affords anchorage with shelter from southerly winds, bottom, sand and shells. The best shelter is near the head inside the 3-foot rock in 5 to 6 fathoms, but it is suitable only for small craft. Large vessels should anchor in mid-channel just inside the entrance in 12 to 13 fathoms.

The eastern shore of Sitka Sound has many deep indentations with numerous offlying islands, rocks, and reefs. Between these there are deep channels which, by reason of their tortuous courses and detached rocks, are unfit for navigation by any but small vessels.

Hot Springs Bay is considerably obstructed by rocks and islets. **Sanitarium**, at the hot springs on the northerly side of the bay, is a post office, hotel, and health resort; regular communication is had with Sitka. The hot springs have a temperature of about 145° F.,

and the water contains sulphur, chlorine, iron, and magnesia. Landing at Sanitarium is made at a float, which has a least depth of 25 feet at low water.

Vasilief Bank is two rocks ½ mile apart which are covered at half tide and generally marked by breakers; the western rock lies 6¼ miles 34° true (N ¼ E mag.) from the northwest end of Biorka Island.

Kulichkof Rock lies 2¼ miles north-northwestward of the western rock on Vasilief Bank. It is about 200 yards long, 20 feet high, steep-to and bare. A small patch of rocks, awash at high water, lies ¼ mile north-northwestward of the rock, and a rock awash at low water lies ¼ mile southwest of the rock.

Zenobia Rock lies 2 miles northeastward of Kulichkof Rock and nearly 1 mile southwestward of Liar Rock, the western rock of The Eckholms; it has 16 feet over it.

The Eckholms is a small group of islets and bare rocks, the easternmost wooded. The middle Eckholm is marked by a beacon.

Deep Inlet, the narrow entrance to which is eastward of The Eckholms, has no anchorage.

Camp Coogan Bay, on the southeast side of Eastern Channel, has a narrow but clear entrance, and a landlocked anchorage inside for small vessels in 7 to 12 fathoms, muddy bottom. Several streams enter at its head, where a flat makes out nearly ¼ mile. There are no dangers in the bay. Near its entrance, narrow boat passages connect with No Thorofare Bay.

Silver Bay, at the northeastern end of Eastern Channel, extends north for ¾ mile, then east for 4 miles, with an average width of ½ mile. **Salmon Cove** is on the north side 1 mile inside the entrance; Bear Cove is on the north side halfway up the eastern arm. Small vessels can find contracted anchorage in Salmon Cove in 14 to 15 fathoms, muddy bottom. In **Bear Cove** the anchorage is deep, 23 fathoms, and the anchorage space is small. On the south side at the head of Silver Bay is a small island, inside of which anchorage can be had by small vessels in 15 fathoms; a shoal largely bare at low water extends 80 yards off the east end of the island. The **Vodopad River** enters the southeast end of Silver Bay by a waterfall. Small vessels can anchor just below the waterfall in 16 to 20 fathoms.

Jamestown Bay, on the north side of Eastern Anchorage, 1⅜ miles east of Sitka Wharf, affords anchorage in 11 to 13 fathoms, muddy bottom, about 400 yards from shore and 300 yards westward of the rocks awash at high water in the northeastern part of the bay.

For a description of the bays at the north end of Sitka Sound see page 198.

St. Lazaria Island lies 5 miles east-northeast of Cape Edgecumbe and 1¼ miles off the south side of Kruzof Island. It is ½ mile long and very narrow in the middle. The western end is high and wooded; the eastern end is lower and less wooded. There is a passage on either side of the island.

Vitskari Rocks are a mass of bare rocks and reefs 1 mile long and ½ mile wide, most of which show at lowest tides. The largest rock is at the southeast end of the group, and lies 5¼ miles northeastward of St. Lazaria Island; it is about 20 feet high, and is marked by a beacon. There is a channel 1 mile wide between the rocks and Low

Island; but the channel between the rocks and Kulichkof Rock is always used by vessels going to Sitka.

Simpson Rock, with 9 feet over it, lies 650 yards eastward of the eastern Kayak Island and 350 yards south-southeastward of the south end of Whale Island. It has no kelp and is marked on its southern side by a buoy.

Tsaritsa Rock, awash at lowest tides, lies 5/8 mile northeastward of Simpson Rock and 600 yards southward of the east end of Galankin Island. It has no kelp and is marked on its southeast side by a buoy.

Rocky Patch is about 3/8 mile long and 300 yards wide. The shoalest water is 3¼ fathoms in two places lying about ½ mile east-southeastward and eastward of The Twins. The southwest 3¼ fathoms patch is marked by a buoy.

Kayak Islands, ¾ mile north-northwest of The Eckholms, are a narrow group of small, partly wooded islands, with a length of ¼ mile in a northwest and southeast direction, and form the southeast corner of the groups of islands fronting Sitka.

Passage Islands, ¼ mile west of Kayak Islands, with a clear channel between, are a low, sparsely wooded group with a length of 250 yards east and west. Ledges, which partly cover at high water, extend 100 yards west of the group. A rock with 5 feet over it lies 175 yards north-northeastward of the western wooded islet of the group, and another rock with 15 feet over it lies 300 yards west-northwest of the northwest wooded islet, with a 4¾-fathom passage between. There is a deep channel between these rocks and Surf Rock which is sometimes used by local pilots.

Surf Rock, ¼ mile west of Passage Islands, is awash at high water and has deep water around it, except on its northwest side, where the water is shoal to a distance of 150 yards. A rock, with 19 feet over it, lies 300 yards west-northwest of Surf Rock. The passage west of Surf Rock is sometimes used by vessels leaving Middle Channel and going into Western Channel.

Keene Rock, lying 3/8 mile north-northeast of Surf Rock, has 13 feet over it. There is deep water close-to southeast of the rock, but northwest of it the water is shoal, with depths of 4½ to 5 fathoms, for a distance of 150 yards. The rock is in the way only when entering or leaving Middle Channel by the passage west of Surf Rock.

Rose Rock lies 350 yards southeastward of Volga Island; it is covered at half tide. A rock with 12 feet over it lies 110 yards west of Rose Rock.

Mitchell Rock, 450 yards eastward of Volga Island, has 5 feet over it.

Turning Island, 3/8 mile north-northeastward of Volga Island, is small and its western part wooded. It is the northern island on the western side of Middle Channel. A shoal extends 50 yards east and 90 yards northeast of the island. Two rocks lie 100 and 200 yards south-southwest of Turning Island; the northern one is about 5 feet high; the southern one is awash at high water.

Makhnati Rock, with 9 feet over it, lies ¼ mile southward of Makhnati Island; it is marked by a buoy.

Makhnati Island, on the east side at the entrance to Western Channel, is the southernmost of the islands south of Japonski Island. It is wooded and marked on its south side by a beacon.

Signal Island, wooded, lies on the east side of Western Channel ⅜ mile northwest of Makhnati Island. A sunken reef marked by kelp extends 350 yards westward from the islands ¼ mile north of Signal Island; the western end of the reef lies 400 yards north-northwestward of the western end of Signal Island.

Sentinel Rock, about 15 feet high and bare, is the southernmost island on the west side of Western Channel; it lies about ¾ mile westward of Makhnati Island. There are a number of rocks bare at low water southward of Sentinel Rock, the outer one lying ⅜ mile 197° true (S by E ¼ mag.) from Sentinel Rock and there is no safe channel between. These rocks are marked by breakers with any swell.

Usher Rock, about 10 feet high and bare, lies a little over ½ mile northward of Sentinel Rock, with a number of rocks, bare at low water, between. A rock, with 14 feet over it, lies 300 yards southeastward of Usher Rock.

Battery Island, the north island on the east side of Western Channel, lies ⅞ mile northward of Signal Island. It is well wooded.

Channel Rock lies ⅜ mile northeastward of Battery Island and nearly in mid-channel between the west end of Japonski Island and the mainland northward of it. The rock is of small extent and bares about 4 feet; a shoal with less than 20 feet on it extends 125 yards north and nearly 200 yards east-northeast from the rock. The rock is marked by a beacon and it may be passed on either side. The channel north of Channel Rock is about 125 yards wide with depths of 5 to 8 fathoms and is marked by a buoy on each side.

Japonski Island has shore ledges on its north side to a distance generally of 100 yards, but from 200 to 600 yards east of its western end the shore ledges make out 200 yards.

The bight on the north side of Western Anchorage is shoal for a distance of 350 yards from shore.

A shoal, largely bare at low water, extends 135 yards from the north side at a point 250 yards west of Harbor Rock. The range of Harbor Rock spindle and the south end of the warehouse on Sitka wharf leads close to the south edge of the shoal. A buoy is placed on the southern edge of the shoal and marks the north side of the western end of the channel northward of Harbor Rock.

Harbor Rock lies in the channel north of Japonski Island and nearer the northern shore. It bares about 4 feet and is marked by a spindle and at its northwest end by a buoy. A narrow spur, with 7 to 10 feet over it, extends 130 yards westward of Harbor Rock, and there is a rock, with 6 feet over it, 30 yards north of the rock. A flat, rocky shoal connects Harbor Rock with Japonski Island; the channel over the shoal favors the spindle and has a practicable depth of 14 feet. The 14-foot curve is 40 yards south of Harbor Rock. From Japonski Island shore ledges extend 90 yards, and a spur, with 10 to 12 feet over it, extends toward Harbor Rock 60 yards farther, its north end being 125 yards south of Harbor Rock and marked by a buoy.

The channel northward of Harbor Rock has deeper water, between 20 and 22 feet, but it is very narrow and the turn is short for a long vessel, so that most vessels going to the wharf wait until the tide is high enough to go through the channel south of the rock.

The channel north of Harbor Rock is marked by buoys on both sides.

Indian Rock has 5 feet over it and lies 180 yards northwestward of the end of Sitka wharf. A rock with 16 feet over it lies 90 yards westward of Indian Rock and 260 yards west-northwestward of the end of Sitka wharf.

The channel at Sitka wharf is narrowed to 75 yards by foul ground, which extends 60 yards north and 100 yards east-northeast from the islet opposite the wharf; the outer rock of this foul ground is bare at low water and lies 110 yards south of the wharf.

Sitka, on the northerly side of Sitka Sound, has a number of Government buildings, Indian Industrial School and Home, a native village, sawmill, cold-storage plant, and wharf and float for small boats. There are several general stores at which provisions and some fishermen's supplies can be obtained; water can be had at the wharf. There are no docking facilities and only minor repairs to small craft can be made. Some of the mail steamers call at Sitka, and a local vessel makes regular trips to Juneau and way ports. There is cable and radio communication. The wharf has a depth of 24 feet. The Government wharf on Japonski Island has depths of 18 to 28 feet at its end, but the depths lessen westward, and at 100 feet from the wharf in that direction, on the line of its face, there is about 13 feet.

Channels.—From sea there are three channels leading to Sitka among the islands and reefs on the north side of Sitka Sound. **Eastern Channel** is the widest and main entrance, and the principal dangers are marked by buoys. **Middle Channel** has its entrance between Kayak Islands and Passage Islands; it is narrow and leads among the islands, and is seldom used. **Western Channel** is sometimes used by steamers entering from sea and desiring to go to the wharf with head southeast; the channel has its entrance on the west side of Makhnati Island.

Southward of Harbor Rock the channel is about 75 yards wide, with a practicable depth of 14 feet, though there is a depth of 15½ feet in mid-channel. Northward of Harbor Rock the channel has a depth of 20 to 22 feet, and is buoyed, but it is very narrow and the turn is short for a long vessel.

Anchorage in 12 to 14 fathoms, muddy bottom, can be had at the Eastern Anchorage, ¼ to ½ mile east of the wharf and 250 to 300 yards off the islands on the south side; directly abreast of Middle Channel the swell from outside renders the berth a little uneasy in southerly weather. Small vessels can anchor at the Middle Anchorage, westward of the wharf, between it and Japonski Island; the holding ground is not good, the tidal currents have considerable velocity, and with a strong wind a vessel may drag. Anchorage can also be had at the Western Anchorage, eastward of Channel Rock, but it is not very convenient because of its distance from the landing. During the winter months northeast gales sometimes sweep across the Eastern and Middle Anchorages with considerable force and render them rather unsafe. In southerly gales the sea is considerably felt at both the Eastern and Western Anchorage.

Winds.—The following observations relative to winds are from an early report:

When at the anchorage at Sitka, if the wind blows east-northeast and no breakers are visible on Vitskari and Kulichkof Rocks, the wind outside will be

found to come from southeast or northeast, but probably the latter. On the other hand, if the surf be visible on these reefs, when the wind at the anchorage is east-northeast the wind outside and within the sound as far easterly as Vitskari Rocks will be found to proceed from the south or west, and it is not advisable for a sailing vessel to attempt to go to sea.

In spring and summer, when easterly winds prevail outside, they are nearly always found to blow northwest inside the sound.

The **tidal current** in the sound sets northward on the flood and southward on the ebb with an estimated maximum velocity of 2 knots among the islands and less in the open sound.

The direction of the tidal current past the wharf appears to be irregular, and not altogether influenced by the wind. Usually the current on the last 1½ hours of the falling tide and first 4½ hours of the rising tide sets westward, and the current on the last 1½ hours of the rising tide and first 4½ hours of the falling tide sets eastward, sometimes attaining a velocity of 2 knots, with a period of slack between, but no positive rule for this can be given.

DIRECTIONS, SITKA SOUND.

Entering Sitka Sound from southeastward, bring the northwest end of Biorka Island to bear 81° true (NE ½ E mag.), distant 4 miles, and steer 36° true (N ½ E mag.) for 10½ miles to a mid-channel position between Vitskari Rocks and Kulichkof Rock. Then bring the largest of the Vitskari Rocks (marked by a beacon) to bear 261° true (SW ½ W mag.) astern, distant about 2 miles, and steer 81° true (NE ½ E mag.) about 5½ miles, taking care to pass southeastward of the buoys marking Simpson and Tsaritsa Rocks. Haul northward around Tsaritsa Rock buoy, leaving it at a distance off of about 400 yards, and steer 31° true (N mag.) about 1 mile, when The Twins should be on the port hand, distant about 400 yards. Haul westward around The Twins, leaving them 300 yards on the port hand, and steer for the end of Stika wharf, course 307° true (W ½ N mag.).

INSIDE WATERS, SITKA SOUND TO SALISBURY SOUND (CHART 8281).

A **rocky spur** extends 300 yards from the northeast shore at a point 1⅜ miles westward of Sitka and 300 yards northwestward of the buoys at Channel Rock. It has a depth of 11 feet at its end and is in the way when approaching from northwestward. Its end is a little south of the range of Sitka wharf and the black buoy. This ledge extends eastward along the northern shore nearly to Harbor Rock; north of Channel Rock its southern edge is marked by a black buoy, the channel being between it and the red buoy.

A **reef** well marked with kelp extends from the eastern side of Kasiana Islands 1,100 yards in a southeast direction, and terminates in a rock bare at lowest tides. This rock lies on a line from the northeast tangent of Kasiana Islands to the middle of Battery Island, and nearly midway between.

Old Sitka Rocks are a group of eight rocks which always show, and extend ½ mile west-northwest from the eastern shore. The northern and largest one has two or three scraggy trees and the rest are bare. The western rock of the group covers only at highest tides. The main channel is westward of Old Sitka Rocks, but there is a narrow

channel between them and an island near the shore. The shore from Old Sitka Rocks to Western Anchorage should not be approached closer than 300 yards.

Old Sitka Harbor is a bight, open westward, on the east side 1½ miles north of Old Sitka Rocks, and just south of the entrance to Katlian Bay. There are some Indian shacks on the point dividing the two coves on the east side of the harbor. The north cove is filled by a flat, and there is a rock, bare at low water, 150 yards off the north shore westward of the end of the flat. The anchorage is abreast the south cove, about 400 yards from shore, in 18 to 20 fathoms, soft bottom. Westerly winds and some sea have a fair sweep into it.

Katlian Bay has its entrance nearly 2 miles north of Old Sitka Rocks and extends in a north-northeasterly direction, curving eastward at its head, for 4 miles, with a width of ½ mile at its entrance, widening to nearly 1 mile at its head. There are no dangers except a flat which extends ¼ mile from the head of the bay. At 2½ miles within the entrance to the bay an arm extends northwestward 1½ miles; fair anchorage can be had in this arm northwestward of the group of islands on the north side, in 15 to 20 fathoms, and a very small vessel can anchor in the narrow part at the head of this arm in 5 to 10 fathoms.

Promisla Bay is on the northwest side of Sitka Sound, 2 miles west-southwestward from Siginaka Islands. It is 1 mile long and ½ mile wide, and there is a small wooded island in its mouth with a bare rock ¼ mile east-northeastward of it. The depths in the bay range from 15 to 20 fathoms, and a fair anchorage can probably be had near its head in the former depth, though the bottom is rocky in places; this should give fair southerly protection.

Olga Strait is 4 miles long in a west-northwesterly direction, with an average width of ¼ mile, and forms a part of the inside route from Sitka to Salisbury Sound. It is in general clear, with ruling depths ranging from 7 to 20 fathoms in mid-channel, and a vessel can anchor anywhere in its length. On both sides of the channel are small flats, where streams empty, and the shores are fringed with kelp except off these flats. The tidal **currents** from Sitka Sound and Salisbury Sound meet in Olga Strait; the estimated maximum velocity in Olga Strait is 2 knots.

A little more than ¾ mile west of the eastern entrance is a **shoal** off the south shore, extending about one-third the way across. It has 18 feet over it and is marked by kelp which watches only with a weak current.

Middle Shoal lies 2¼ miles from the eastern entrance to Olga Strait and between two small streams, one on each side. It is 400 yards long in the direction of the channel, with lumps having 16 to 18 feet over them. The least depth near the middle is marked by a buoy on the north side of the shoal. Kelp grows all over the shoal, but is rather fine and watches only at low water slack. The bottom is hard and in some places rocky on the shoal.

Nakwasina Passage surrounds Halleck Island and is 11 miles long; its entrances are at the east and west ends of Olga Strait. The **eastern arm** has a northerly direction for 5 miles, with a width of 1 mile, except at its entrance, where it is contracted to ¼ mile by **Crosswise** and **Beehive Islands**. There is a narrow but clear channel between these islands. A very small vessel can anchor in the cove west of

Beehive Island in 5 to 8 fathoms. The eastern arm has no hidden dangers; there is a flat 400 yards wide in the large bight on the east side 2 miles inside its entrance, and a flat extends ¾ mile from the head of the arm. Temporary anchorage may be made at several points in the arm, for which the chart is a sufficient guide. The **western arm** has a north-northeasterly direction, and is clear for 1½ miles from its entrance, with depths of 15 to 25 fathoms, affording anchorage. There are no dangers if the shores be given a berth of 300 yards, except a flat ½ mile long and 300 to 400 yards wide, on the east side, which begins 1 mile north of Halleck Point at the entrance. Beginning about 1½ miles from its entrance, the western arm has an east-northeasterly direction for 3½ miles to the eastern arm, with a winding channel contracted in places to 100 yards or less by large flats, and with a depth of about 20 feet. The limits of the channel show at low water, and it is suitable only for small craft.

Krestof Sound lies west of Krestof Island and connects Neva Strait, at **Sound Islands**, with Sitka Sound, through Hayward Strait. The sound is out of the line of travel and is of no commercial value. At its northwest end the sound connects by a high-water passage with Sukoi Inlet. At its south end the sound is filled by Magoun Islands, with a narrow channel east and west of them and a boat channel through them. **East Channel** is clear in mid-channel, except a kelp-marked rock, covered at one-third flood, which lies just west of mid-channel and ¼ mile south of the point where the channel changes direction. **West Channel** should not be attempted except by small craft. **De Groff Bay** opens northward from East Channel; its entrance is narrow, has a depth of 19 feet, is overgrown with kelp, and should only be attempted by small craft. **Port Krestof** is a broad bight on the south side of West Channel; an anchorage can be had in 7 to 15 fathoms, taking care at high water not to get on the flat which fills the south end of the port to a distance of ½ mile out to an islet. **Hayward Strait** has a good channel through it, but the shores are fringed with rocks and reefs, especially at its southeast entrance, where they extend to mid-channel from the southwest side and well off from the northeast side.

Currents.—The flood current enters Krestof Sound from Salisbury Sound through Neva Strait and, when the water has risen high enough, through Sukoi Inlet; also from Sitka Sound through Hayward Strait, and they meet somewhere in the sound. There is not much current in the northwest part of the sound, but it has considerable velocity through Hayward Strait and the narrow channels at the southeast end. It is probably slack at about the time of high and low water at Sitka.

Neva Point Reef extends 200 yards south-southeast from Neva Point, on the northeast side of the southeast entrance to Neva Strait. It is marked by a spindle.

Neva Strait is 4 miles long in a general west-northwesterly direction and varies in width from ⅛ mile at Whitestone Narrows to ⅜ mile at its northwest end at Entrance Island; it is narrow throughout, and more or less foul, requiring careful piloting, especially in the narrows, where the channel is only 40 yards wide and will not permit of any deviation. The least depth in the channel is 4 fathoms at Whitestone Narrows. The limits of the channel, for the most

part, are well marked with thick kelp, which shows when the current is weak. At low-water slack the limits are best defined by bare rocks and kelp.

Whitestone Narrows (chart 8281, insert) are in Neva Strait, between 5/8 mile and 1 mile from the southeast end. The southwest shore of the narrows is foul for a distance off of 250 to 400 yards. This foul ground has numerous ledges bare at low water, and is covered with kelp at slack water. The channel side of these ledges is marked by buoys.

Whitestone Rock, at the southeast end of the narrows, is 3 feet high; there is foul ground westward of it, and depths of 12 to 15 feet extend 125 yards north-northwestward. A rock, with 10 feet over it and kelp, lies 100 yards east-southeastward of Whitestone Rock and is marked on its northeast side by buoy No. 1. Abreast this buoy, on the northeast shore, is a ledge with kelp, extending 100 yards from high-water mark, contracting the channel to 100 yards. Three hundred yards southeast of this ledge is a bare rock close to the northeast shore.

Whitestone Point is 350 yards northward of Whitestone Rock, with a good channel between; it is low and rocky close-to, with a ledge extending 150 yards northwestward. Four hundred yards northwestward of Whitestone Point is a mid-channel ledge, awash at lowest tides, and covered with kelp. It is marked on its north and south sides by buoys. A little over 1/3 mile in the same direction from Whitestone Point a flat extends 250 yards from the northeast shore, and is marked at its southern edge by spar buoy No. 2.

There are two channels through Whitestone Narrows, both of which are buoyed. The usual channel leads close northeastward of buoys Nos. 1 and 3, southwestward of buoy No. 2 (nun), and northeastward of buoy No. 5 (spar). This channel is about 100 feet wide, but is clear and plain when the buoys are in place, with 3½ to 4 fathoms at low water. The kelp is not a guide as it grows clear across; it is thinner, however, in mid-channel than on the edges, being cut up somewhat by vessels' screws. The older and deeper channel follows the northeasterly shore, passing northeastward of all buoys except spar buoy No. 2, the northernmost; the turns in this channel are sharp and hard to make with a long vessel when the current is running.

The tidal current sets through Whitestone Narrows parallel to its axis, but divides on the middle ledge, and a part of it passes around Whitestone Point northward of the ledge. The current turns from northwest to southeast 11 minutes after the time of low water at Sitka, and from southeast to northwest six minutes before the time of high water. The velocity of either stream at strength is about 1.7 knots.

Whitestone Cove, north of Whitestone Point, is a good anchorage for small craft.

Columbine Rock, about 3 feet high and marked by a beacon, lies close to the southwest shore of Neva Strait, about midway of its length. On the opposite side of the channel, distant 250 yards, is a kelp-marked shoal with 10 feet over it.

From Columbine Rock to Highwater Island the northeast shore is foul, and the course usually followed leads along the southwest shore at a distance off of about 150 yards.

Wyvill Reef, about midway between Columbine Rock and Highwater Island, extends to mid-strait, and its highest point is covered at three-quarters flood. The south edge of the reef is marked by a buoy. From the bight in the southwest shore opposite the buoy a flat makes out 150 yards.

Highwater Island is wooded, prominent, and connected with the northeast shore at low water.

A rock with 15 feet over it, surrounded by kelp and marked by a buoy, lies midway between the northwest end of Highwater Island and the southwest shore. The channel is between the buoy and the island, a width of about 175 yards.

From Highwater Island to Entrance Island the usual track is in mid-channel. A rock, covered at three-quarters flood and surrounded by kelp, lies about 100 yards from the northeast shore, halfway between Highwater and Entrance Islands. A shoal extends 150 yards from the bight in the southwest shore opposite. A shoal with 16 feet over it and well marked by kelp, lies 400 yards southwestward of Entrance Island and 200 yards off the southwest shore. The channel is between the island and this shoal.

Entrance Island, small and wooded, lies close to the eastern point at the northern entrance to Neva Strait.

St. John Baptist Bay commences 2½ miles eastward of Kane Islands. It is 2 miles long by ½ mile wide at its entrance, but soon narrows to less than ¼ mile and terminates in a flat ⅜ mile wide. The north shore is clear and bold for 1 mile, when some ledges, bare at low water, make off 50 to 75 yards. The south shore, from Entrance Island to where the bay narrows, forms a shallow bight filled with kelp and ledges and two rocky islets about 300 yards offshore. After passing the choke place the south shore is clear. The anchorage is in the narrow part after passing the first point on the north side, in 9 to 12 fathoms. This bay is open to the sea, out through Salisbury Sound, which gives the northwest winds a clear sweep to the anchorage, and in southeast weather it is said to be subject to severe williwaws, all of which make the anchorage undesirable.

Gilmer Cove is on the south shore 1½ miles southeastward of Kane Islands. It is 400 yards long by 75 yards wide, with a flat 200 yards wide at the head, and is a fit anchorage only for small craft.

Kane Islands are two principal islands, low and wooded, with several rocks and reefs close-to, except on the east side, where they extend 300 to 400 yards in a direction parallel to the channel. They are surrounded by kelp and there is good water close to its edge. The channel is good on either side of the islands, but that on the north side is always used, as being more direct.

Sukoi Inlet has its entrance on the south side, ¾ mile west-southwest of Kane Islands and 1 mile east-southeast of Scraggy Island. It is about 4 miles long in a southeasterly direction, ¼ mile wide, and affords good anchorage. At its head it connects at high water by a canoe passage with Krestof Sound. The inlet is comparatively clear until near its head, but the shores are foul. Anchorage may be selected in any place desired, according to depth of water and swinging room required. The best anchorage is 2¾ miles inside the entrance, opposite a small stream and flat on the west side, in 10 fathoms, width of anchorage ground 500 yards. Only small craft should go into the narrow arm beyond this.

Scraggy Island lies 1¾ miles westward of Kane Islands and ½ mile from the south shore. It is about 40 feet high and scantily wooded with two clumps of trees. Ledges with bare heads extend 800 yards southeastward and 600 yards southward from the island. The channel south of the island is not recommended. The island is surrounded by ledges, bare at low water, to a distance of 100 to 200 yards.

Salisbury Sound is described under a separate heading on page 212.

Courses and distances from Sitka to Juneau are given in the table of courses on page 25.

PERIL STRAIT

(charts 8282, 8283) is important as affording a frequently used inside passage from Salisbury Sound, and the waters southward, to Chatham Strait. Its total length is about 41 miles. From Salisbury Sound it extends in a general northerly direction for 12 miles through Kakul Narrows, Sergius Narrows, and Northern Rapids to Povorotni Island; this part of the strait is narrow, has frequent changes in direction, and strong tidal currents, and strangers, other than small craft, are advised to take a pilot. From Povorotni Island the strait has a general northeasterly direction for about 4½ miles to Otstoia Island. where it turns eastward for 16 miles to Lindenberg Head, and then northeastward for 7½ miles to Chatham Strait. Some of the more serious dangers are marked by buoys or lights. A pilot may sometimes be obtained at Sitka, Killisnoo, or Juneau.

Kakul Rock lies 350 yards southwestward of the outer and larger island at Point Kakul; it has 16 feet over it, shows kelp, and at low water shows a breaker during any unusual swell. It is marked on its western side by a buoy.

Brad Rock is 175 yards from the west side of Kakul Narrows, and ¼ mile southwestward of the outer Channel Rock, in line with it and the bare rock off Range Point. It is of small extent, has 7 feet over it and leaf kelp at slack water, and is marked on its eastern side by a buoy. There are heavy tide swirls through this narrow part of the strait. The buoy tows under at the strength of large tides.

Channel Rocks extend 250 yards north-northwestward from the east point at the north end of Kakul Narrows. The largest rock is about 3 feet high, and close-to north of it are two rocks which cover only at the highest tides. A rock bare at low water lies close-to northwest of the latter. There is thick kelp close-to north and east of these rocks.

Fish Bay has its entrance on the eastern shore southward of Sergius Narrows, and extends eastward about 5 miles, with an average width of 1 mile. Sand or gravel beaches show along the shores at low water, and there is a flat nearly ½ mile wide at its head. **Haley Rock** lies in the entrance, 450 yards from the southern shore, and from the rock the western half of Rapids Island is open on Fish Point, bearing north-northwestward. It has 4 feet over it and is surrounded by kelp. A **rock**, with 9 feet over it and surrounded by kelp, lies 250 yards westward of Haley Rock. **Haley Anchorage**, 300 yards from the south shore and ¼ mile westward of Haley Point, has depths of 18 to

20 fathoms, sandy bottom, and is fair in southerly weather. **Haley Point** is a sand flat terminating in a high-water island.

Schulze Cove, on the north side of Fish Bay, is about ¾ mile wide and 1 mile long in a north-northwesterly direction, and is the best and most convenient anchorage southward of Sergius Narrows for vessels awaiting slack water in the narrows. **Piper Island,** low and wooded, lies in the entrance, the navigable channel, about ¼ mile wide, lying between it and the western shore; the channel on the east side of the island should not be attempted. The cove is free from dangers if the shores be given a berth of over 100 yards. The anchorage is in the middle of the cove in 14 to 16 fathoms, soft bottom, with good protection; small vessels can anchor at the head of the cove in 7 to 9 fathoms. The only danger in the approach is Haley Rock. A rock, with 9 feet over it and surrounded by kelp, lies ¼ mile eastward of Piper Island and the same distance from the northern shore.

Suloia Bay has anchorage for small craft near its head, in 12 to 15 fathoms, rocky bottom. The shores are foul near the anchorage, contracting it somewhat, and it is not recommended. Swirls make well into the bay. **Suloia Islet,** wooded, lies in the bay ¼ mile from the south side with rocks between. **Suloia Rock,** bare at low water, lies 400 yards northward of Suloia Islet.

Sergius Narrows.—The channel at Sergius Narrows is only 100 yards wide at low water between the 3-fathom curves, and it is advisable for a stranger to carry a pilot when using it. There are no local pilots for Sergius Narrows, though one may possibly be obtained at Sitka, Killisnoo, or Juneau. Vessels should pass through Sergius Narrows at or near the middle of the slack water period, especially with the large tides, and preferably at "high water slack." At the strength of the current it is not safe for any vessels bound either way, especially long ones, between Francis Rocks and Liesnoi Shoal. At weakest neap tides those with local knowledge pass through at all stages of the current. (See also "Currents," p. 209.) Vessels awaiting slack water at Sergius Narrows usually slow down before reaching it. If desiring to anchor, Schulze Cove is convenient when south of the Narrows; when north of the Narrows, Bear Bay is convenient for small vessels; Deep Bay is a much better anchorage, but its entrance is narrow. The beacon on Sergius Point is not visible when approaching from northward.

Rapids Island is a small wooded island near the middle of Sergius Narrows.

East Francis Rock, lying 350 yards southwestward of the southwest point of Rapids Island, is of small extent, and has a reported depth of 8 feet over it and no kelp.

West Francis Rock, with 9 feet over it, lies 400 yards westward of the southwest point of Rapids Island; it is 100 by 70 yards in extent and has depths of 5 and 6 fathoms close-to. It has leaf kelp, which shows only at slack water, and is marked by a buoy, heavily moored, about 150 feet northward of it. Vessels pass westward of the rock. In this vicinity the swirls and whirlpools are very strong while the current runs south.

Prolewy Rock is usually above water, but is slightly covered at highest tides; it lies 175 yards northward of the middle of the north

side of Rapids Island. **Wayanda Ledge**, within the 3-fathom curve, extends 200 yards northward of Prolewy Rock, its northwest edge lying 125 yards from the northwest shore of Serguis Narrows. There is a depth of 4 feet over the ledge, and it drops off quickly to the 3-fathom curve. The channel is between the ledge and the western shore, and at its narrowest part is but 100 yards wide at low water between the 3-fathom curves.

Liesnoi Shoal lies nearly in mid-channel 300 yards southward of Midway Rock. It is about 60 yards in extent, and has a least depth of 8 feet. It is marked by a buoy moored in 9 fathoms close to the edge of the kelp between the shoal and Mountain Head, and 400 yards from the latter.

Midway Rock is awash at highest tides.

Bear Bay, on the east side southward of Bear Bay Island, has anchorage for small vessels only, but is convenient if awaiting slack water in Sergius Narrows. Enter in mid-channel and anchor with Arthur Island in line with the south side of Bear Bay Island, bearing north-northwestward in 14 to 16 fathoms, soft bottom. On the southeastern side, halfway up the bay, is a ledge which uncovers at low water, and vessels should not go above the range given to avoid swinging onto this ledge.

Deep Bay, on the west side between Big and Little Islands, is a good anchorage 1 mile long and over ¼ mile wide, and is the most convenient anchorage for large vessels northward of Sergius Narrows when awaiting slack water in the narrows. **Grasstop Rock**, about 5 feet high, lies between Big and Little Islands, and is marked by a beacon; the best passage into the bay is between the rock and Big Island. To enter, keep the south side of Big Island aboard at a distance of 100 yards in passing Grasstop Rock to clear a sunken kelp-marked ledge, which extends from the rock halfway to Big Island. Then follow a mid-channel course into the bay and anchor ¼ to ¾ mile inside the wooded islet on the north side west of Big Island, in 10 to 12 fathoms, soft bottom. A flat extends ⅝ mile from the head of the bay. A sunken rock is reported to lie about 300 yards from the south side of Deep Bay and a little over ½ mile west-southwestward of the wooded islet on the north side west of Big Island. A ledge, marked by kelp, with a rock which bares near its eastern end, extends 250 yards eastward from the eastern end of Little Island. A bare rock, about 10 feet high, lies 100 yards east of Big Island, and kelp extends 100 yards east of the rock.

Middle Point Rock lies 300 yards west-southwestward of Middle Point with a narrow channel between. The rock is covered at half tide and marked by a red iron spindle with cage. There is deep water 60 yards west of the spindle. A ledge, with 14 feet over it, lies 350 yards from Arthur Island toward Middle Point.

Opasni Islands (Big and Little Rose Islands, wooded) lie in mid-channel 3 miles southeastward from Pogibshi Point; Adams Channel is the passage eastward of them. An extensive flat, dry at low water, lies in the bight on the southeast side of Adams Channel. A rock bare at half tide lies 150 yards westward of the small wooded point forming the western end of the bight, and there is thick kelp between.

Rose Island (Adams Channel) Rock lies off a bight on the east side of Big Rose Island, about 200 yards from the island, and is on the line of the south end of the island and Rapids Point. It is bare at

low water and is marked on its eastern side by a buoy. **Rose Channel Rock** lies 250 yards westward of the northwest end of Little Rose Island and 400 yards from the southwest shore. It is awash at highest tides and is a danger only when using Rose Channel. **Nixon Shoal** is a flat, bare at low water, which projects 200 yards from the mouth of a stream on the northeast side ¾ mile north of Opasni Islands. **Povorotni Island**, low and wooded, lies 500 yards west-northwestward of Pogibshi Point. It shows against a wooded highland in coming from northward and is not readily seen until fairly close-to. A bare ledge lies between the island and **Pogibshi Point**; the narrow passage between this ledge and the point is suitable only for boats and small craft. Lying 200 yards southward of the island is the northwest end of a narrow ledge, 250 yards long in a southeasterly direction, with a least depth of 7 feet. A spot with 12 feet over it lies 125 yards west-northwestward of the island.

Poison Cove has its entrance on the west side westward of Povorotni Island, and affords anchorage for small craft only. Anchor in the middle, about 300 yards inside the south point at the entrance, taking care to avoid the flat nearly ⅜ mile wide at the head, in 18 fathoms, soft bottom.

Deadman Reach.—Between Povorotni Island and Otstoia Island anchorage may be made in several places along the eastern shore. **Pogibshi Point Anchorage** is on the northern side of Pogibshi Point, off the entrance to a small lagoon in a small grassy flat, in 22 fathoms, sandy bottom, with the point bearing southwestward, distant ¼ mile. A sand and gravel bar makes out 250 yards into the bight. **Favorite Anchorage** is about 1¼ miles southward of Otstoia Island and ¼ mile from shore, in about 17 fathoms. Anchorage may also be made in 16 to 20 fathoms with Broad Island in line with the east side of Otstoia Island, and with the northern side of Emmons Island showing between Krugloi and Elovoi Islands.

Ushk Bay has its entrance on the west side, 2¾ miles southward of Emmons Island. It extends westward and southward 4 miles, with an average width of ¾ mile, narrowing to ⅓ mile at the point where it changes direction. It affords secure anchorage near its head in 18 to 20 fathoms, soft bottom, and a mid-channel course carries in safely. A flat extends nearly ½ mile from its head.

Hoggatt Reefs, lying 1¼ to 1¾ miles south-southwestward of Krugloi Islet and 1¼ miles from the eastern shore, cover an area of about ½ mile square, with shallow water between them. The largest and highest part of the reef is at the northeastern end, and is a sand islet covered only at highest tides. Three ledges, covered at about half tide, lie ¼ mile westward of this islet; and two rocks, covered at ordinary high water, lie about ¼ mile southward of it.

Dolph Rock, bare at low water, lies ¾ mile off the south side at the entrance to Ushk Bay and 1¼ miles west-southwestward of the islet of Hoggatt Reefs.

Ford Rock lies ⅞ mile northwestward of the islet of Hoggatt Reefs and 1½ miles west-southwestward of Krugloi Islet, nearly in line between it and the northern point at the entrance to Ushk Bay; it is 150 yards long and bare only at lowest tides.

Hooniah Sound is the prolongation of Peril Strait westward of Broad Island. **Emmons Island**, large and 600 feet high, is on the south

side in its entrance; the channel south of it should be used with caution and at low water. **Moser Island,** 2½ miles westward of Emmons Island and 5 miles long, divides Hooniah Sound into two arms, connected at high water at the west end of Moser Island.

The **northern arm** of Hooniah Sound is 10 miles long, and comparatively clear until 2 miles from its head, where there is a rock, bare at low water, in mid-channel south-southeastward of the eastern end of an island on the northern side, with no safe channel between. A flat extends ½ mile from the bight on the south side ¾ mile southeastward of this island, and a flat extends ½ mile from the head. Anchorage can be made near the head of the northern arm above the island in 22 to 25 fathoms.

The **southern arm** of Hooniah Sound is comparatively clear, but the south side should not be approached too closely. On the south side, 1 mile within its entrance, there is a small arm, the head and western shore of which are shoal; a wooded islet lies just east of it: anchorage can be made in the entrance in 20 to 22 fathoms. Two miles farther westward the southern arm divides; the northern branch connects at high water with the northern arm, and a flat extends ¾ mile from its head; in the middle, about 1¾ miles within its entrance, there is a rock bare at low water; anchorage can be made 300 to 500 yards above the rock in 13 to 16 fathoms. The southern branch has shoals fringing its western side, and a flat ¾ mile wide at its head; anchorage can be selected near its head in 24 fathoms.

Otstoia Island (wooded, dead standing timber at northeast end) lies 1 mile west-southwestward of Nismeni Point. **Elovoi Islet** (small, well wooded) and **Krugloi Islet** (small, clump of trees in middle) lie close together ⅝ mile west-southwestward of Otstoia Island. A **flat** extends from the east shore about 300 yards, contracting the channel between it and Otstoia Island to a clear width of about 150 yards. It is marked by a buoy placed 50 feet from the low-water edge of the flat in 9 fathoms. The flat continues alongshore with the same width for a distance of 1 mile southward of the buoy. **Cozian Reef,** with 5 to 6 feet over it, extends ½ mile northeastward of the north end of Otstoia Island. It is marked on the eastern side of its northern end by a buoy.

Broad Island is 200 feet high, wooded, and lies ½ mile off the north shore.

Nismeni Point is low and wooded and lies 1½ miles southward of Broad Island. A sunken **rock** lies 200 yards from the eastern shore and ½ mile west-southwestward of Nismeni Point; it is almost in line between the point and the north end of Otstoia Island. **Two rocks,** bare at low water, lie 600 and 800 yards, respectively, northeastward of Nismeni Point with a sunken rock between them and the point.

Nismeni Cove, on the eastern side of Nismeni Point, affords anchorage for small craft, with protection from southerly winds. To enter keep the southeast shore aboard at a distance of about 200 yards to avoid the rocks off Nismeni Point, and anchor in the middle of the cove about ⅜ mile from the head, in 7 to 10 fathoms, fair holding ground.

Peschani Point is a low grassy point on the south side, 2 miles westward of Rodman Bay. A **flat** surrounds Peschani Point and extends

¼ mile into the strait for a distance of ½ mile east and west of the point. A stream empties east of the point.

Rodman Bay, on the south side 6 miles eastward of Nishmeni Point, is 6 miles long in a south-southwesterly direction and has a good anchorage at its head. The soundings in the entrance are very irregular, and the shores at the entrance should be given a berth of ½ mile. A rock with 6 feet over it lies in the bay ⅝ mile from the eastern point at the entrance and is marked by a buoy; vessels should pass westward of the buoy. **Appleton Cove**, on the east side 1 mile within its entrance, has numerous rocks and shoals, and affords anchorage for small craft only. Lauf Islands lie on the east side near the head of Rodman Bay. The anchorage is ¼ to ⅜ mile south of Lauf Islands in 14 to 15 fathoms, soft bottom. Streams enter the southeast and southwest corners of the head of the bay, and flats extend off ½ mile from their mouths. A mid-channel course leads safely to the anchorage.

Saook Bay has its entrance on the south side of Peril Strait southwestward of False Lindenberg Head. It extends southwestward for 2 miles, and thence southward for 1 mile to the flat which extends ¾ mile from its head. It affords a good and convenient anchorage with shelter from all winds. Water can be obtained from small streams.

To enter take a mid-channel course until the second small islet on the east side is abeam, then keep the east shore aboard at a distance of 150 yards to avoid a sand and gravel flat which extends to mid-channel from a small stream coming from a ravine in the western shore. The anchorage is in mid-channel ½ mile southward of this ravine, in 19 to 20 fathoms, muddy bottom.

False Lindenberg Head (rocky cliffs, wooded on top) is 2¼ miles westward of Lindenberg Head.

Lindenberg Head, a wooded knoll 250 feet high, is a projecting point on the northern shore.

Lindenberg Harbor is a small cove on the west side of Lindenberg Head, and affords protection from northward and eastward. The anchorage is in the middle of the cove in 12 to 15 fathoms, with indifferent holding ground.

McClellan Rock covers at highest tides and lies 350 yards southward of Lindenberg Head, with no safe passage between. It is marked by a light.

Hanus Bay is a broad open bight in the south shore southward of Lindenberg Head. At its southeast corner Hanus Bay connects at high water with the north arm of Kelp Bay. At the western end of the bay are two coves, the southern one nearly bare at low water. The northern cove is about ½ mile long and has anchorage for small craft; ledges, bare at low water, lie about 250 yards off the points of this cove. Hanus Bay is not recommended for large vessels on account of its irregular bottom and exposed situation. A temporary anchorage might be made in its entrance.

A sunken rock, with 6 feet over it, lies nearly ¼ mile eastward of the western point of a small open bight on the north shore about 1¾ miles eastward of Lindenberg Head.

Eva Islands, close to the south shore 2 miles southwestward of Fairway Island, have broken ground on all sides. A sunken rock lies 600 yards north-northeastward of the small rocky islet northwest

of Eva Islands. **Svensen Rock**, sunken and sparsely marked by kelp, lies ½ mile west-southwestward of the same islet.

Fairway Island, lying 2 miles west-northwestward of Point Thatcher, is wooded, 320 feet high, and marked at its northeast end by a light. A **rock**, with 7 feet over it and marked by kelp, lies ¾ mile southwestward of Fairway Island light. Ledges, mostly bare at half tide, extend 600 yards northeastward of the island. South of Fairway Island the bottom is very irregular, and there are numerous rocks and reefs, some of which show only at extreme low water, while the sunken rocks are but poorly indicated by kelp.

Midway Reef is about 5 feet high at its southern and highest part and ⅜ mile long in a northwesterly direction. Its north end is bare at low water and lies ¾ mile east-northeastward of Fairway Island light.

Point Craven, the south point at the entrance to Sitkoh Bay, is marked by two rocks (outer one about 10 feet high, inner one smaller) close-to, all connected at low water; the point lies 1¼ miles north-northwestward of Fairway Island, and is marked by a light on the outer rock.

Point Hayes, the northern point at the entrance from Chatham Strait and the northern side of the entrance to Sitkoh Bay, is moderately high, but is low at the end. Two wooded islets, about 60 feet high, and a bare rock lie close to the point.

Morris Reef is a dangerous group of ledges and sunken rocks surrounding Point Hayes to a distance of nearly 1 mile on its northeast and southeast sides, and extending southwestward of the point halfway across the entrance to Sitkoh Bay. The southeast extension of the reef is broken ground with kelp and depths of 4 to 7 fathoms, possibly less, which extends ½ mile farther, and is marked at its southeast end by a buoy placed 1⅜ miles east-southeastward of the islet off Point Hayes, and 2⅜ miles north-northeastward of Fairway Island light. On line between the buoy and Peninsular Point (1½ miles northward of Point Hayes) is an extensive reef, marked by kelp, and partly bare at low water, which lies ⅝ mile northeastward of Point Hayes.

Sitkoh Bay has its entrance between Point Craven and Point Hayes, where it is nearly 1 mile wide, and extends west-northwestward for 6½ miles, the last 4½ miles being about ⅜ mile wide. The bay is deep throughout in mid-channel, but there are several flats at the mouths of streams, and an extensive one 1 mile wide at its head. Morris Reef extends nearly halfway across its entrance. There is a cannery (post office, **Chatham**) on the south side 2 miles inside the entrance to the narrow part of the bay; fresh water can be obtained. The eastern wharf has about 11 feet at its end, and off its eastern end is a rock, sometimes marked by a barrel buoy. The western wharf has about 20 feet at its end. Anchorage can be made ¼ to ⅜ mile from the head of the bight on the northern shore 2 miles from Point Hayes, in 15 to 20 fathoms, rocky bottom, sheltered except from southeast winds. Secure anchorage can be had near the flat at the head of the bay 1⅜ miles above the cannery in 17 to 22 fathoms, soft bottom.

Entering Sitkoh Bay, keep the Point Craven shore aboard distant ¼ to ⅜ mile to clear Morris Reef, and then keep in mid-channel. At ½ to ¾ mile above the cannery a flat makes out 400 yards from an

islet near the southern shore; the northern shore should be favored slightly when passing it.

Point Thatcher, the southern point at the entrance to Peril Strait, is low and wooded, and terminates in a ledge 250 yards long, with three bare heads. A rock, covered at half tide and surrounded by kelp, lies 100 yards northward of the outer bare head. **Anchorage** may be had under Point Thatcher with fair protection from southerly winds. Enter between Point Thatcher and Midway Reef and anchor about midway between Point Thatcher and the point 1⅜ miles westward in 16 to 20 fathoms, rocky bottom, taking care to give the shore a berth of ¼ mile.

Fog from Salisbury Sound occasionally makes into Peril Strait as far as Sergius Narrows, and at times fills the strait northward of the Narrows.

Currents, Peril Strait.—The flood current from Salisbury Sound sets northward through Sergius Narrows and Adams Channel and meets the flood from Chatham Strait in the broad part of Peril Strait between Povorotni Island and Otstoia Island; the ebb current from the meeting point sets in the opposite direction. The estimated maximum velocity is 4 knots in Kakul Narrows, 2½ knots abreast the entrance to Fish Bay, 10 to 12 knots in Sergius Narrows, 3½ knots from Liesnoi Island to Yellow Point, 5 knots in Adams Channel, 2½ knots between Opasni Islands and Povorotni Island, and 1½ to 2½ knots from Povorotni Island to Chatham Strait. In Hooniah Sound north of Emmons Island the velocity at strength in both directions is 0.2 knot.

Currents, Sergius Narrows.—In Sergius Narrows the current turns from north to south 2 hours before the time of high water at Sitka, and from south to north 1 hour and 41 minutes before the time of low water. The average velocity of the north-going stream at strength is 5.7 knots, and that of the south-going 5.8 knots. A velocity of 8.2 knots has been observed. Mariners are advised to be on hand a sufficient time before the predicted times given in the tide tables (say ½ hour or more) in order to make sure of the desired slack water in case the predictions happen to be too late. The predicted times of slack waters for every day in the year for Sergius Narrows are given in the Pacific Coast tide table.

At the strength of the current the water is very much disturbed, heaving up over the ledge in the middle and boiling and swirling in the channel, especially at the end where the water is passing out. The channel is so narrow and the current so variable in direction that if a vessel gets a sheer she may be carried on the ledge or shore before she can be straightened out. With a strong north-flowing current a sharp deflection occurs at Shoal Point, which is dangerous, especially to long vessels bound southward, as it sheers the bow eastward in the direction of Wayanda Ledge, and there is little room to straighten out again on the proper channel line. With a strong south-flowing current a similar sharp deflection occurs westward of West Francis Rock, which is dangerous, especially to long vessels, bound either way, as it sheers the bow in toward the cove on the west side.

Vessels should pass through the Narrows at or near the middle of the slack-water period, especially with the large tides, and pref-

erably at "high-water slack," as the channel is only 100 yards wide between the 3-fathom lines at low water. When the current is running strong it is not safe for vessels bound either way, especially long ones, between Francis Rocks and Liesnoi Shoal. At weakest neap tides those with local knowledge pass through at all stages of the current.

The **variation of the compass** is given on page 41. Small local attractions have been observed as follows:

On the straight course from Otstoia Island to Povorotni Island a local attraction was observed ranging from ¼ to ½ point east, from 1½ miles northward of Povorotni Island to 1 mile southward of Otstoia Island; closer inshore this local attraction will probably be larger. These local attractions increase the general easterly variation for these localities by the amounts stated.

On a course passing ¼ mile southward of McClellan Rock, a local attraction of about ¼ point east was observed from McClellan Rock halfway to Fairway Island, where it ceased. Sufficient observations were not taken to determine the position and amount of the maximum deflection in this locality, but the fact of the existence of a local attraction here should be kept in mind.

Courses and distances through Peril Strait are included in the table of courses from Sitka to Juneau on page 25.

COAST FROM SITKA SOUND TO SALISBURY SOUND.

This coast is formed by the west side of Kruzof Island, which trends north-northwestward for 20 miles, and is indented by Shelikof and Gilmer Bays. Mount Edgecumbe (described on p. 192) occupies the southern third of Kruzof Island and is an unmistakable landmark for this part of the coast.

The shore is clear for coasting, there being no hidden outlying dangers so far as known, until Cape Georgiana is reached. Sunken rocks do exist, however, in the bays and bights. The 100-fathom curve is 8 miles from shore abreast Cape Edgecumbe, 12 miles abreast Cape Georgiana, and the soundings decrease regularly to the coast.

Neva Bay, 2½ miles northward of Cape Edgecumbe, has several shacks, and the natives find a landing place for canoes behind the reef at the north point at the entrance.

From Neva Bay 3¼ miles northward to **Beaver Point**, the south point of Shelikof Bay, the shore is lower and is fringed with reefs extending 300 to 400 yards offshore. Just north of Beaver Point is a small open bight, ¾ mile wide and ½ mile long, full of rocks and kelp, which extend 1 mile off the entrance.

Shelikof Bay is 4½ miles wide at its entrance and 3 miles long. The bay is open westward, and is not recommended as an anchorage. The depths range from 10 to 20 fathoms. Off Beaver Point and along the south shore kelp grows thick out to 6 and 10 fathoms. In the southeast corner there is a sand beach 1½ miles long. The north side of Shelikof Bay is foul, numerous rocky islets and ledges extending ¼ to 1 mile offshore.

Slaughter Island, the north point at the entrance to Shelikof Bay, is grass covered and connected with the shore at low water. A **sunken rock** with 11 feet over it lies ⅜ mile west of Slaughter Island.

Point Amelia, 3½ miles northwestward of Slaughter Island and 13¾ miles north-northwestward of Cape Edgecumbe, is the northwest point at the entrance to Gilmer Bay and is the most prominent point between Capes Edgecumbe and Georgiana. The point is the terminus of a peninsula about 1,800 feet high. There are two small knolls at the seaward end of this peninsula, the inner one wooded and about 400 feet high, the outer one a cone-shaped rock about 100 feet high. Rocks bare at half tide lie about 200 yards offshore.

Gilmer Bay, on the southeast side of Point Amelia, is 3 miles long in a northerly direction. About 1 mile inside Point Amelia the bay contracts to ⅝ mile; it then expands to about 1 mile in a distance of 1 mile, and terminates in a narrow arm ¾ mile long by 300 yards wide. The anchorage for large vessels is in mid-channel halfway up this arm in about 15 fathoms, sticky bottom. In summer the swell does not come much beyond the entrance of the arm, but there is no record of the value of the anchorage in winter gales. Small craft report a good all-the-year anchorage in a bight on the east side of the bay about 2 miles inside of Point Amelia. A **sunken rock** lies on the east side in the approach to the bay, on line from Point Amelia to a white rocky islet about 50 feet high and close to the east shore, bearing east-southeastward. The rock lies ⅜ mile from the islet, has 17 feet over it, and shows a breaker at low water with a moderate swell.

Approaching from southward give the eastern shore a berth of over ¾ mile to clear the sunken rock off Slaughter Island and the sunken rock described above. Otherwise there are no dangers and a mid-channel course leads safely through the bay.

In the **bight** 2 miles north of Point Amelia there is a conspicuous sand beach ¾ mile long.

Sealion Rocks lie 3½ miles northwestward of Point Amelia. They extend 1 mile northeast and southwest and are five rocks, the easternmost about ¾ mile from shore. The two largest rocks are 149 and 194 feet high, both covered with grass, the eastern one having a number of dead trees. The easternmost of the group is 75 feet high and partially covered with grass; the remaining two are bare.

Eagle Rock is 1⅝ miles north-northwestward of the westernmost Sealion Rocks and 1¼ miles southward of Cape Georgiana. It is 58 feet high, dome shaped, and bare.

Sealion Cove is a small cove about 2 miles southeast of Cape Georgiana. There is a sand beach at the head nearly 1 mile in length, and a small peninsula ⅜ mile long forms its southern point.

Cape Georgiana is the southern point at the entrance to Salisbury Sound. Back of the cape ¾ mile is a rounded hill 1,400 feet high, and 2 miles east from the cape is the first prominent peak which, from southward and westward, seems to rise from the low point gradually, by a series of steps, and is 2,800 feet high. This is a prominent landmark from southwest for Salisbury Sound. In coming from northwest the sand beach at the head of Sealion Cove, 2 miles southeast of Cape Georgiana, is at times useful in identifying the cape.

Sea Rock is an irregular, bare ledge, ½ mile west-northwestward of Cape Georgiana.

Morskoi Breaker, ⅝ mile westward of Sea Rock and 1⅛ miles from the extreme point of Cape Georgiana, is a sunken rock over which

the sea usually breaks. There is a deep channel between these two rocks, and between Sea Rock and the cape, but neither is recommended. Strong tide rips are found around the cape and these two rocks when the wind is from northwest or northeast, while with a southerly wind they are more prevalent around Point Leo.

SALISBURY SOUND

(chart 8282) has its entrance from sea in latitude 57° 22′ N, longitude 135° 54′ W, and connects Peril Strait and Neva Strait with the Pacific Ocean between Cape Georgiana and Klokachef Island. It is about 6½ miles long in a general easterly direction, 2 miles wide at the eastern end, and 4½ miles wide where it joins the ocean. About 1¾ miles from the eastern end the channel is contracted to 1 mile by Goloi Islands on the north side and Sinitsin Island on the south. Vessels from Cross Sound, Yakutat Bay, and the coast westward bound for Sitka commonly enter through Salisbury Sound, as the distance is less than by way of Cape Edgecumbe and it puts them sooner into smooth water.

The shores of the sound are foul, especially the north side, which is studded with islands, rocks, and reefs, with more or less kelp. It is open to the prevailing wind and sea, and there is generally a southwest swell rolling in and breaking along the northern shore, which sometimes reaches to Baranof Island. There are no dangers through the middle of the sound, but the depths are irregular and the bottom rocky, 20 fathoms having been found about the middle of the entrance.

The country back of the north shore is steep, rugged, and about 3,000 feet high. The southern shore is more undulating, though quite high near the ocean, and is covered with trees from the top to the water's edge.

Approaching Salisbury Sound from seaward, especially from westward, it is sometimes difficult for a stranger to recognize the entrance until close in. The bare, rugged mountains on the north side of the sound are prominent, and the sand beach at the head of Sea Lion Cove, 2 miles southeast of Cape Georgiana, is at times useful in identifying the cape.

Cape Georgiana, the southern point at the entrance to Salisbury Sound, is described under the preceding heading.

Klokachef Island, on the north side at the entrance to Salisbury Sound, is of triangular shape and over 1 mile in extent. On its south side bare cliffs, 1,000 feet high, have the appearance of the northern half of an old crater, and are prominent from well out to sea southwestward. Reefs bare at low water extend 200 to 300 yards from the south and west sides of the island. At the east point are several bare rocks, and a reef which extends ⅜ mile south-southeastward, and over which the sea generally breaks. From the northwest point of the island a partially submerged reef extends 600 yards west-northwestward to two bare rocks 25 feet high; and from these rocks a sunken reef, showing more or less kelp and on which the sea always breaks, extends ½ mile westward. Klokachef Point, the south point of Klokachef Island, is the north point at the entrance to Salisbury Sound.

Olga Rock, 1¼ miles westward of Klokachef Point, on line with Klokachef Point and the north shore of Salisbury Sound, is awash at low water, and, except at high tide and a very smooth sea, always shows a breaker. There is deep water between Klokachef Island and the rock.

Goloi Islands, 6 miles eastward of Klokachef Point and ½ mile off the northern shore, are two in number and bare; the northern one is divided at high water; the southern one is about 35 feet high and has the appearance of a flattened cone. There are a number of other islands along and close to the north shore, but these and Krugloi Islands, ½ mile northeastward, are the most prominent. These islands are surrounded by kelp rather close-to, and there is deep water close to the edge of the kelp on their south sides.

Round Island, 1 mile northeastward of Goloi Islands, is wooded, 200 feet high, and lies close to the north shore of Salisbury Sound at the entrance to Peril Strait.

Peril Strait is described under a separate heading on page 202.

Kalinin Bay, on the south side of Salisbury Sound 2½ miles inside the entrance, has anchorage near its head considerably used by small fishing craft, but its entrance is obstructed by rocks and is narrow. A rock, bare at half tide, lies nearly in mid-channel in the narrowest part of the entrance and nearly abreast of a shack on the easterly side. In entering, favor the westerly shore.

Sinitsin Island, low and wooded, lies ¾ mile northeastward of the entrance to Kalinin Bay, and is the farthest projection on the southerly side of Salisbury Sound. It should not be approached closer than ¼ mile on its northern side and ½ mile on its western side.

Sinitsin Cove, on the south side of Salisbury Sound 1 mile eastward of Sinitsin Island, has deep water, an irregular, rocky bottom, and its shores are fringed with ledges. In bad weather the swell rolls heavily into this cove.

Scraggy Island and the features southeastward are described under a separate heading on pages 201 and 202.

The **tidal current** sets into Salisbury Sound with the flood tide and out with the ebb, with a velocity of 1 to 2 knots. At the eastern end the flood divides, one part setting into Peril Strait for the first 4 hours, when it meets the flood coming through that strait, is turned and backed into Salisbury again, making slack water off the mouth of Peril Strait about the time of slack at Sergius Narrows, 2 hours before high and low water.

The other part flows southward through Neva Strait, and when not influenced by the wind is slack soon after the time of high and low water, but may be carried much longer if the wind is with the old current.

The **wind** draws through Salisbury Sound, generally from sea. **Fog** sometimes banks into the sound very thick, but frequently disappears at the mouth of Fish Bay and Neva Strait.

COAST FROM SALISBURY SOUND TO CROSS SOUND.

(Shown in part on chart 8280.) This coast has a general west-northwesterly direction for about 37 miles from the west end of Klokachef Island to Cape Cross, and then about north-northwest for

10 miles to Yakobi Rock. The main shore is formed by Chichagof Island, which has numerous mountain peaks about 3,000 feet high. From Klokachef Island to Khaz Bay the 100-fathom curve is about 16 miles offshore. The 50-fathom curve is about 6 miles offshore, and inside of that distance the soundings are irregular and less than 50 fathoms, except a narrow pocket with depths of 50 to 87 fathoms, which extends 5½ miles 219° true (S ¾ W mag.) from Khaz Bay entrance. From the entrance of Khaz Bay to Cape Edward the coast is formed by numerous islets, rocks, and breakers, which prevent a near approach to the shore.

Fortuna Strait separates Klokachef Island from Chichagof Island, and is about ½ mile wide, with a clear channel 600 yards wide. The eastern entrance is 600 to 700 yards wide between ledges extending 400 yards westward from Chichagof Island and the reef extending ⅜ mile south-southeastward from the east end of Klokachef Island. Two small kelp patches, with 2¼ and 4¼ fathoms, lie in the strait 350 and 500 yards from the eastern shore and ½ mile northward of the eastern end of Klokachef Island. A rock, with 4 feet over it and kelp, lies 350 yards from the north shore on the west side at the entrance to Leo Anchorage and east of the south side of the island on the north side of the strait.

Fortuna Strait is used, especially by small craft, when bound to Khaz Bay from Salisbury Sound. Approaching from eastward give the north shore of the sound a berth of over ½ mile until off the eastern entrance to the strait, and then steer 0° true (NNW ¾ W mag.) so as to pass 300 to 400 yards eastward of Klokachef Island. Follow the north side of the island at this distance until in midchannel abreast the island on the north side of the strait, and then steer 312° true (W by N mag.) from the strait with the north side of Klokachef Island astern and pass ¼ mile northward of the bare rocks westward of Klokachef Island.

Leo Anchorage, on the north side of Fortuna Strait, is ½ mile long and ½ mile wide at the entrance, narrowing to the head, where there is a stream and small flat. The anchorage affords a fair shelter from northerly winds, but it is not recommended in southerly weather. With southerly winds there is less swell near the west side. The anchorage is near the middle, in 15 to 20 fathoms, or for small craft near the head in 5 to 7 fathoms. The bottom is hard, with sticky patches.

Olga Rock, 1¼ miles westward of Klokachef Island, on line with Klokachef Point and the north shore of Salisbury Sound, is awash at low water, and except at high tide and a very smooth sea always shows a breaker. There is deep water between the rock and Klokachef Island.

Point Slocum lies 3½ miles northwestward of Klokachef Island. A bare, flat rock, about 30 feet high, lies 200 yards south of the point; inside the rock a boat landing can be made in ordinary weather. A breaker lies ⅝ mile west of Point Slocum.

Khaz Head, a bold, bluff headland 1,275 feet high, particularly noticeable from southeastward, lies 7 miles westward of Klokachef Island. It is the western end of a rugged peninsula between Slocum Arm of Khaz Bay and the sea.

Khaz Point, the southern point of Khaz Head, lies 2⅝ miles west-northwest of Point Slocum. The shore between these points forms

a shallow bight in which are numerous breakers. A breaker lies ¾ mile southwestward of Khaz Point.

Middle Breaker and **Khaz Breaker**, both bare at low water, lie 2 and 3½ miles, respectively, westward of Khaz Point.

From Khaz Head a chain of numerous islands, rocks, and reefs, some wooded and all generally low, extend 3½ miles northwestward to Ramp and Deuce Islands, at the entrance of Khaz Bay.

Khaz Bay is described on page 220.

Outer Rocks are the southernmost bare rocks on the west side at the entrance to Khaz Bay. They are two in number, about 200 yards apart; the northern and larger one is about 30 feet high, the smaller one about 15 feet high. A rock, awash at low water and on which there is almost always a heavy breaker, lies ¼ mile southward of the southern rock.

A **breaker** lies 1¾ miles westward of Outer Rocks and 1⅞ miles southeastward of Black Islet.

From Outer Rocks to Cape Bingham the coast is not surveyed. The following information is from reports. The courses and distances are approximate. Strangers having to approach the coast should, if possible, do so at low water, when the principal dangers so far as known will either show above water, or under ordinary conditions, will be indicated by breakers.

Inside the lines joining Outer Rocks, Black Islet, White Sisters, and Cape Edward there are numerous bare rocks and reefs, but the four mentioned are the most prominent and easily recognized.

Black Islet, 3¼ miles west-northwestward of Outer Rocks, is small and the farthest outlying wooded one of the islets and rocks.

A **rock** lies 1½ miles southward of the White Sisters and 2 miles west-southwestward (approximately) from Black Islet. A heavy and continuous break was observed on this rock with the water above half tide and with little swell, and it is probably bare at low water. There are numerous other breaks inside this one, but this is the outermost known danger.

White Sisters are two outlying large white rocks 2½ miles west-northwest of Black Islet.

Cape Edward is the northwest one of two prominent wooded islands about ¾ mile from the coast and 2 miles northward of White Sisters. There is a breaker about ½ mile southwestward of Cape Edward.

Kukkan Bay has its entrance between the island of Cape Edward and the coast, and extends in a general east-southeasterly direction for 3 miles to Ogden Passage at Snipe Rock. It is about ¾ mile wide at Cape Edward and narrows to about 300 yards at its eastern end, and is used by cannery tenders of about 9 feet draft at all stages of the tide.

A bare rock with reefs around it lies about ⅝ mile 312° true (W by N mag.) from Cape Edward, and there is a breaker nearly ¼ mile northward of the rock. The cannery tenders enter about ½ mile northward of the rock and about ¼ mile off the rocky point (marked by a light) abreast of it on the main shore and steer about 138° true (ESE ½ E mag.) for Pole Point, a bare bluff point with high wooded land behind it. Then they pass southward of Pole Point, keeping it aboard at a distance of about 100 yards to avoid a reported sunken rock and kelp lying on the opposite side of the

channel possibly ¼ mile off the point; there is also a large bare rock about ½ mile off the point.

Then steer easterly courses in mid-channel for 2 miles to Snipe Rock and pass southeastward of it into Ogden Passage.

At 1 mile northwestward of Cape Edward is the **South Passage** entrance to Portlock Harbor, about ½ mile wide between the northern point (marked by a light) at the entrance to Kukkan Bay and the south end of Hogan Island. No information is available for this entrance. Bare rocks and breakers extend about ¼ mile southward and ¼ mile westward from the south end of Hogan Island.

Portlock Harbor is formed on its seaward side by Hogan and Hill Islands. **Hogan Island** has bluff, rocky shores, is nearly flat topped, and timbered with scrubby growth. **Hill Island** is flat topped and about 150 feet high. The main entrance, between Hogan and Hill Islands, known as **Imperial Passage,** is about 1 mile long, has a clear width of about ¼ mile at its eastern end, and widens toward the sea. It lies about 3½ miles northwestward of Cape Edward and may be recognized by a group of high bare rocks and breakers, extending about ⅜ mile westward from the northwest end of Hogan Island, on the south side at the entrance, and by a large bare rock, on the north side at the eastern end of the entrance, lying about 200 yards off the southeastern end of Hill Island. The following is the track usually followed from Ogden Passage through Portlock Harbor and leads in apparently deep water:

Pass southward of a rock, bare at low water, close inside the narrow entrance to the passage ¼ mile westward of Port Island, and steer 304° true (W ¼ N mag.) for ⅞ mile, where care must be taken to pass southward of a rock, covered at half tide, which lies possibly 200 yards southward of the eastern one of two islands which nearly close the entrance to Black Bay, a bay making northeastward. Then steer about 347° true (NW mag.) for ⅓ mile and pass through the narrow channel northward of a good-sized island.

Then steer 323° true (WNW mag.) for about ¾ mile, passing southward of a flat and small stream and to a position 150 yards northward of Minnie Rock, covered at half tide. Then steer 301° true (W mag.) for ⅞ mile, then 284° true (WSW ½ W mag.) for 1⅛ miles passing about 400 yards northward of a good-sized island, about 300 yards southward of a small island with a balanced bowlder at its south end, lying about ¼ mile off the north shore, and then 150 yards southward of a reef covered at half tide. Then steer 267° true (SW by W mag.) for ¾ mile with the south point of Hill Island ahead, passing northward of three islands close together.

When the northerly point of Hogan Island is abeam, steer about 230° true (S by W ¾ W mag.) for ⅝ mile to a position 200 yards southeastward of the large bare rock off the southeast end of Hill Island. Then 259° true (SW ¼ W mag.) for ⅓ mile, and then 301° true (W mag.) for 1 mile, after which keep about 1 mile off the Hill Island shore.

From the entrance to Portlock Harbor, the coast has a northwesterly direction for 7 miles to Ilin Bay. At 4¼ miles above the entrance to Portlock Harbor there is a prominent, round, wooded island at the southeast point of a bight of the coast having a sand beach, the only one in the vicinity, and in which is the Hooniah

warm spring. Bare rocks extend ¾ mile southward from the island to two outlying bare rocks. There is a breaker ¼ mile southward of these two rocks and another about ½ mile southwestward of the island. The usual course is about 358° true (NW by N mag.), passing ¼ mile westward of these two breakers, about ⅜ mile eastward of Porcupine Islands and ¼ mile eastward of a bare rock ¾ mile above the islands.

Porcupine Rock is a prominent bare rock, about 25 feet high, lying about 1½ miles southward of Point Urey and 1 mile from the nearest bare rocks off the point.

Porcupine Islands, so named from the shape of the outer one, are three wooded islands, lying 2 miles eastward of Porcupine Rock in the bight of the coast, and about 1 mile offshore. Extensive bare ledges prolonged by breakers extend fully ½ mile south from the islands.

Two rocky islets lie about ½ mile northwestward of Porcupine Islands, and a sunken rock, showing a breaker at low water in moderate sea, lies nearly ¼ mile northwestward of the rocky islets.

Porcupine Bay has its entrance about 1¾ miles northward of Porcupine Islands. The bay is about ½ mile in diameter, and a sounding of 9½ fathoms was made in the middle. It is apparently a secure anchorage for a small vessel. There is a waterfall at the northeast end of the bay, which shows from off the entrance. There is a prominent wooded islet in the middle of the entrance, and bare ledges close to the southeast side of the islet. The bay can be entered in any weather by passing 300 yards southward of Porcupine Rock and then favoring the Point Urey shore. Pass through the narrow channel southeastward of the wooded islet in the middle of the entrance.

Ilin Bay has its entrance ¾ mile westward of Porcupine Bay. It is about ½ mile long, narrow, rocky, and exposed southward, and suitable for small craft only.

Approaching from westward pass in mid-channel northward of Porcupine Rock and steer 73° true (NE ¼ N mag.) for ¾ mile, heading for two rocky islets northwestward of Porcupine Islands. Then steer 42° true (N by E mag.), passing ¼ mile westward of the rocky islets and about 200 yards westward of the sunken rock nearly ¼ mile northwestward of them. When ¼ mile past the islets, pass 250 yards eastward of a high bare rock, the outer one of a group near the coast. When ⅓ mile past this rock, steer 346° true (NW mag.), pass about 300 yards westward of the two wooded islets on the east side at the entrance to Ilin Bay and to a position 150 yards westward of a bare rock near the east side of the bay. Then steer 25° true (N ½ W mag.) and pass 150 yards eastward of a bare rock on the west side.

Point Urey, on the east side at the southern entrance to Lisianski Strait, is marked on its southwest side by many large, high, bare, rocky islets, which extend off possibly ¾ mile. The southernmost known break is on a rock, covered at half tide, which lies about ½ mile northwestward of Porcupine Rock and south-southeastward of the westernmost high, bare rock off Point Urey. The only known sunken rock on the east side of the entrance to the strait lies north-northwestward of the westernmost high, bare rock off Point Urey.

There is reported to be a good anchorage for small craft close northwestward of Point Urey.

Point Theodore is marked by a few small bare rocks close around the point, but there is an isolated rock awash at high water, about ½ mile southward of the point, with depths of 10 to 12 feet for 300 yards or more southward and westward from it.

Lisianski Strait is apparently deep and navigable for vessels, but there are two places where the tidal currents have a velocity of 3 knots or more at strength, producing swirls—one abreast the wooded island on the east side at the southern entrance, and the other in a distance of 1½ miles southward from its junction with Lisianski Inlet at Miner Island. In heavy weather there are probably heavy tide rips at the southern entrance to the strait on the ebb. The strait has not been surveyed, but in a reconnaissance of the locality, passage through the strait was made on a good low water, and the dangers, so far as known, are mentioned.

Pass about ¼ mile eastward of the rock awash at high water off Point Theodore, and about 400 yards eastward of the eastern bare rock off the point, and steer about 25° true (N ½ W mag.) up the middle of the strait for about 5½ miles until abreast the entrance to **Stag Bay,** which extends eastward for 5 miles, with a width of ¼ mile or more. There is a small wooded island on the east side of the strait just inside the southern entrance; kelp extends about 200 yards westward from the island and rocks, awash at high water, and which should be given a good berth, extend about ½ mile northward from the island to a bare islet, from which kelp extends about ¼ mile northward. There is a rock bare at half tide toward the north side of the bay on the east side northward of this islet.

From abreast the entrance to Stag Bay the course is about 346° true (NW mag.) for 1¾ miles to a mid-channel position between a point on the west side and a short grassy flat on the east side. For a distance of nearly ¾ mile southward of the point on the west side there is a bight filled by a flat, covered at high water, which extends outside the points of the bight.

The course is then about 9° true (NNW mag.) in mid-channel nearly 2 miles, and when about ¼ mile southward of the islets on the eastern side take care to avoid a spit, bare at half tide, which makes out possibly 300 yards from the western shore. From here to Miner Island the strait is 500 to 600 yards wide, and there are strong currents and swirls at times. The islets lie about 300 yards from a point on the eastern shore, and the southern one is wooded.

Pass about 200 yards westward of the islets and steer about 42° true (N by E mag.) in mid-channel for 1 mile to the narrowest part of the strait, which is here ¼ mile wide and changes direction eastward. The turning point on the east side has a reef about 100 yards off, and abreast it kelp makes out a short distance from the west side.

Then, if going to Cross Sound, steer about 110° true (E by N mag.) and round Miner Island, keeping it aboard at a distance of 300 yards to avoid the kelp patches northwestward of Junction Island. **Miner Island** is about ¼ mile long and is joined to Yakobi Island by a sand spit; it is the turning point from Lisianski Strait to Lisianski Inlet. **Junction Island** is wooded and lies in the northern entrance to the strait ¾ mile eastward of Miner Island. A bare ledge extends 200

yards northward from Junction Island. A small patch of heavy kelp on a sunken rock lies ¼ mile northwestward of Junction Island. A kelp patch over a sunken reef lies about ⅜ mile eastward of Miner Island and ½ mile northwestward of Junction Island. The channel is between the latter kelp patch and Miner Island, and no bottom was found midway between with 16 fathoms of line. There is also a clear channel south of Junction Island.

Lisianski Inlet has an east-southeasterly direction for about 21 miles from Cross Sound. The mid-channel is clear so far as known. There is a large flat, with deep water close-to, at the head. At about 2 miles below the head, and abreast a prominent point on the south side an extensive flat, mostly bare at half tide, extends two-thirds the distance across the inlet from the northern shore. When passing it the south shore should be kept aboard, distant about 200 yards. There is reported to be a rock with 6 feet over it about ¾ mile northwestward of Miner Island and 200 yards off the southwesterly shore.

The entrance from Cross Sound is clear with the exception of rocks, above and under water and marked by kelp, which extend 600 yards southwestward from Column Point, the northeast headland at the entrance from Cross Sound.

Mite Cove is an anchorage for small vessels on the southwest side of Lisianski Strait, 2½ miles within its entrance from Cross Sound. Inside of **Mite Island**, which lies in its entrance, the cove is ¼ mile long and about 275 yards wide, with depths at the anchorage of 9 to 10 fathoms, soft bottom. The entrance is southeast of Mite Island and is clear. Mite Island is joined to Yakobi Island by a sand spit.

Cape Cross, comparatively low and wooded, lies about 5½ miles west-northwestward of Point Theodore. Three-eighths mile off the cape is a high, rocky islet, and outside of it bare rocks extend about ⅜ mile. Seen from southeastward the islet is white, with a stripe of dark-green grass and scrubby trees up the middle. There are also numerous bare rocks on the southeast side of Cape Cross to the entrance of Takanis Bay. The southernmost known rock is but little above high water, and lies possibly ¾ mile southward of the cape.

Takanis Bay, 1 mile eastward of Cape Cross, is about 1 mile long in a northerly direction and about ½ mile wide in places. The bay is exposed southward and is a fair-weather anchorage for small vessels only. **Point Satchrun**, the east point at the entrance, is high and bold, while on the west side are numerous bare rocks. The bight southeastward of the point is foul, and the bare rocks in it should be given a berth of over ½ mile. The westernmost break off this bight lies possibly ½ mile southeastward of Point Satchrun.

Enter in mid-channel westward of Point Satchrun on a 25° true (N ½ W mag.) course until ⅝ mile above the point and 250 yards off a rocky point on the east side. Then steer 37° true (N ½ E mag.) and anchor in 10½ fathoms in the northeast end of the bay. A rock, bare at low water and on which there is sometimes a breaker, lies in the middle about 300 yards from the head of Takanis Bay, and is the only covering rock known in the bay.

From Cape Cross the coast trends northwestward for 7½ miles to **Cape Bingham**. At the cape there is a rock, on which there is nearly always a breaker, about ⅜ mile outside the bare rocks near the coast.

Here the coast changes direction to about north-northwest for 2½ miles to Yakobi Rock.

Surge Bay, lying 3½ to 5½ miles above Cape Cross, is an open bight with numerous rocks, and is suitable only for small vessels with local knowledge, but should not be attempted in westerly weather. There are numerous bare rocks off both points of the bay, and in the bay, favoring the southeast side, is a long, high, rocky islet, with two grassy knolls on it, which is the best mark for the bay. A group of low, bare rocks lies southward of the islet, and a rock awash at low water lies 400 yards southward of the outer bare rock. The best entrance is eastward of the islet; the entrance westward of it is through kelp.

Enter on a 48° true (N by E ½ mag.) course midway between the rock awash, described above, and a kelp patch about ¼ mile eastward of it, and pass midway between a cluster of high bare rocks (some trees on middle of highest) and the group of lower rocks described above. When the outer rock is 300 yards on the port beam steer 42° true (N by E mag.) until 400 yards eastward of the islet, and then 34° true (N ¼ E mag.) to the entrance of two coves. The eastern one trends southeastward, is about 600 yards in diameter, and there is a rock, bare at low water, and kelp on the southwest side of the bay for 150 to 200 yards east-northeast from the south point at the entrance; the anchorage, in 8 fathoms in the middle of the bay, is exposed southwest. The western cove is open southward.

From the point westward of the western cove kelp extends about 100 yards southward. Steer westward between this kelp and the nearest rocks, about 400 yards southward, and then steer about 346° true (NW mag.). Leave a rock, bare at low water, and kelp about 50 yards on the port hand and head up about 20° true (N by W mag.) into the entrance to a narrow inlet. Then steer about 42° true (N by E mag.) to pass eastward of an island; the passage west of the island is blocked by rocks at its northwest end. Anchorage can be had eastward of the southern part of the next island northward with perfect shelter. The entrance to this inlet lies about north of the islet with two green knolls out in the bay; the least depth found in entering the inlet was 4¼ fathoms, and it is apparently a secure anchorage for a small vessel.

Hoktaheen Cove, lying ⅞ mile southeastward of Yakobi Rock, is suitable only for small craft with local knowledge and is exposed southwestward.

KHAZ BAY.

(chart 8280), lying about 11 miles westward of Klokachef Island, is 2¼ miles wide at its entrance between Ramp Island and Outer Rocks, and extends northward 2 miles to Quit Point. Here it divides into an extensive system of inland passages extending eastward, northward, and westward, and which connect with the sea northwestward of Cape Edward through Kukkan Bay and Portlock Harbor.

The entrance is wide and has deep water, but is difficult to recognize on account of the many islets and bare rocks. There are a number of breakers in the entrance, which show unless at high water with an exceptionally smooth sea, and assist in daylight and clear

weather in shaping the course. Once in the entrance, vessels should have no difficulty in going through Slocum Arm, or through Ogden Passage to Mine Cove. Klag Bay is difficult except for small vessels at slack water.

Middle Breaker is on a rock bare at low water and lies 2 miles westward of Khaz Point and nearly 1 mile from the nearest islet northeastward.

Khaz Breaker is the outer danger in approaching Khaz Bay from southward, and is on a reef about ¼ mile long and bare at low water. It lies 1⅜ miles west-southwestward of Middle Breaker and 2¾ miles southeastward from Outer Rocks.

Outer Rocks are the southernmost bare rocks on the west side at the entrance to Khaz Bay. They are two in number, about 200 yards apart; the northern and larger one is about 30 feet high, the smaller one about 15 feet high. A rock, awash at low water, and on which there is almost always a heavy breaker, lies ¼ mile southward of the southern rock.

Black Rock, lying 1⅛ miles north-northeastward of Outer Rocks, covers at high tide and is generally marked by a heavy breaker.

Ramp Island is small, about 100 feet high, and scantily wooded. It is the westernmost of the islands on the eastern side of Khaz Bay.

Deuce Island is the northwest wooded island on the eastern side of Khaz Bay, and lies ¾ mile northward of Ramp Island. At its western end is a round bald knob about 100 feet high.

Nine-Foot Shoal, about ½ mile northwestward of Deuce Island, is marked by a buoy.

Quit Point is the south end of the southernmost of the low wooded islands on the northwest side in the entrance to Khaz Bay, and lies 1¼ miles west-northwestward of Deuce Island. The end of the point is bare, and at the timber line is about 90 feet high. This island is somewhat higher than others near it, and from most points shows as two knobs, the southern one the larger and higher, with a saddle between. A bare, rocky islet lies ⅜ mile west-southwest of Quit Point, and there is foul ground between this islet and Gray Rock, which is awash at high water and lies ⅜ mile southward of Quit Point.

Gray Rock is awash at high tide and lies ⅜ mile southward of Quit Point. The bottom between Gray Rock and a high bare rocky islet ⅜ mile northwestward of it is foul and generally marked by breakers.

The channel between Deuce Island and Quit Point is 1¼ miles wide and is clear except a shoal spot with a least depth of 9 feet, which lies between them nearly ½ mile from Deuce Island. It is marked by a buoy.

Guide Rock, bare and about 15 feet high, lies ⅜ mile northeastward of Quit Point, and is the easternmost of the bare rocks extending ¼ mile eastward from the island northward of the point. It is an important mark for entering any of the arms.

Doolth Mountain, 2,120 feet high and wooded, lies 6 miles north-northwestward of the entrance to Khaz Bay. It stands out from the higher mountains farther inland and is the most prominent one near the coast.

Slocum Arm.—This arm extends 12 miles east-southeastward from Khaz Bay, and is ¾ mile wide. Its south side is formed by the mountainous peninsula terminating westward at Khaz Head, and by

the chain of wooded islands extending 3½ miles west-northwestward from that head to Deuce Island. The arm is free from dangers with the exception of a rock, bare at half tide, lying 300 yards from the northern shore and 1 mile east-northeastward of the northern bare rock northward of Deuce Island.

From Khaz Point there is a narrow, rocky, and crooked channel among the rocks and islets close to the western end of Khaz Head, through which small craft, with local knowledge, can enter Slocum Arm, but it is very difficult for strangers.

Ford Arm, 2¾ miles eastward of Deuce Island, extends 2½ miles northward from Slocum Arm, with a width of about ¼ mile, but contracted to less in places by islands and rocks. At its head is an expansion about ¾ mile in diameter, from which arms extend eastward and westward. There is a cannery on the northerly side of the expansion. The eastern arm is about 1 mile long with some islets and a flat at its head; there is anchorage for vessels below the islets in 10 to 20 fathoms. The western arm is 2 miles long, and has anchorage for small craft at its head in 10 to 15 fathoms. Small craft can also anchor in the cove north of the north point at the entrance to the western arm in 5 to 8 fathoms; a ledge bare at half tide is close to the north side of the cove.

The entrance to Ford Arm is marked on the west side by two grassy flats with a native shack, and on the east side by a group of small wooded islands which should not be approached closely.

Falcon Arm, 1¼ miles eastward of Ford Arm, extends northward 2 miles with a width of ¼ to ⅜ mile and narrows to 350 yards at its head. A rock, with 2 feet over it, lies 200 yards from the eastern side at the entrance, and a rock, bare at low water, lies 250 yards north of this rock and 100 yards off a projecting point on the eastern side. At ⅜ mile inside the bay there is a rock with 1 foot over it in the middle. Favor the western shore for ½ mile from the entrance to avoid these rocks, and then keep in mid-channel. The depths in the wide part of the arm are 22 to 25 fathoms. There is good anchorage in an expansion above a point on the western side 1½ miles from the entrance in 13 to 15 fathoms.

Waterfall Cove, 1¾ miles eastward of Falcon Arm, is identified by a large waterfall about 1 mile above its head. There are two bights at the head; the eastern one is dry at low water, the western one has 7 to 8 fathoms and affords anchorage for small craft.

Island Cove, 4 to 4½ miles eastward of Falcon Arm, has some islands in it near the shore. There is anchorage in the eastern end of the cove in about 16 fathoms. Favor the eastern point of the cove when entering, and avoid a flat which extends 300 yards from the north shore of the anchorage.

On the south shore opposite Island Cove is a small point with a wooded knoll 80 feet high. There is anchorage for small craft in the cove west of this point in 8 to 10 fathoms.

Flat Cove, on the north side 6 miles eastward of Falcon Arm, has depths of 25 to 30 fathoms to the flat which extends 700 yards from its head.

There is good anchorage ½ to ⅝ mile from the head of Slocum Arm in 16 to 18 fathoms. A flat extends nearly ¼ mile from its head.

Klag Bay and approaches.—Klag Bay has its entrance through a narrow, crooked channel with foul shores and strong currents, and

is difficult except for small vessels at slack water. Strangers should enter at low-water slack, when the dangers will either show above water or be indicated by kelp. The main entrance is on the northern side of Smooth Channel through The Gate, and thence through Elbow Passage, which leads around the southern and eastern sides of Klag Island into the bay. The western end of Elbow Passage connects with Ogden Passage, and affords another entrance to Klag Bay from Ogden Passage.

The Gate has its entrance 1 mile northwestward of Guide Rock. It is 600 yards long in a north-northwesterly direction, 100 yards wide in its northern and narrowest part, and has depths of 6 to 10 fathoms. The tidal currents have great velocity, and the passage should be used at or near slack water only. A temporary anchorage can be found 250 to 300 yards south of the sparsely wooded islet forming the east point at the south entrance to The Gate in 15 to 20 fathoms.

Klag Island, ¾ mile long, lies in the southern end of Klag Bay. The pass west of the island is nearly blocked at its north end and is suitable only for boats or launches.

Elbow Passage, on the south and east sides of Klag Island, has an average width of 300 yards, but the channel is contracted in places to 150 yards by kelp-marked shoals.

The western part of Elbow Passage is 1 mile long from The Gate to Ogden Passage and is contracted in places to 75 yards, with mid-channel depth of 5½ fathoms. On the north side at the entrance from Ogden Passage a sunken kelp-marked reef makes out 100 yards to a rock which shows 1 foot above high water. The entrance is close south of this rock. The last of the ebb sets out southwestward with great velocity through this entrance, forming heavy swirls, and it should be attempted only at slack water, preferably low-water slack.

Northward of Klag Island, Klag Bay is about 2 miles long, and is comparatively clear, though there are a number of islands in it and there is foul ground along the eastern shore inside the islands. The depths are moderate—under 20 fathoms, affording anchorage in any part of it. On the west side at the northern end of the bay is a mine and stamp mill.

Chichagof is a post office, mining camp, and stamp mill on the west side of Klag Bay at its northern end. Supplies in limited quantities can be obtained. There is good anchorage in the middle of the basin off the wharf in 4 to 5 fathoms.

Lake Anna has its entrance through a narrow channel from the east side of the northern end of Elbow Passage. In the lake, 400 yards eastward of the narrow entrance, is a large reef bare at half tide and marked by kelp, which is avoided by keeping the shore southward of it aboard at a distance of 150 yards, or the shore westward of it 250 yards. There is anchorage at the south end of the lake in 15 fathoms. At 1 mile northward of the entrance a ledge with bare heads extends to mid-channel from the east side; the channel is westward of it. At the north end of the lake there is anchorage in 16 to 20 fathoms.

Sister Lake is joined to the northeast end of Lake Anna by a narrow, foul passage ⅕ mile long, navigable only for boats at slack water. The south end of this lake is only 200 yards from Ford Arm

and the same distance from a small bay at the north end of Khaz Bay, with low land between.

Tidal Currents.—In The Gate, Elbow Passage, and entrance to Lake Anna the tidal currents have great velocity at times, with heavy swirls, and these passages are navigable only at slack water, especially with the large tides. Slack water in The Gate and Elbow Passage occurs approximately 1½ hours after the time of high and low water at Sitka. At the time of slack water there is a period varying inversely with the range of tide from 20 minutes to 1 hour when the current has little or no velocity.

Ice is seldom encountered in Klag Bay, but it is reported that for short periods during especially severe winters it forms enough to delay navigation.

Ogden Passage.—From Khaz Bay there are two channels leading to Ogden Passage. **Rough Channel**, the southwest one, is about ½ mile wide westward of Gray Rock, but at its northwest end there are rocks above and under water which contract it to about 200 yards. There is generally a heavy swell in the channel, and it should be avoided except possibly at low water with a smooth sea.

Smooth Channel, the best entrance to Ogden Passage, is protected from the ocean swell by a chain of wooded islands and ledges. From north of Guide Rock it extends 1½ miles in a west-northwesterly direction, and is 200 yards wide in its narrowest part, with depths of 7 to 15 fathoms.

From Smooth Channel, Ogden Passage extends westward and then northwestward for 2 miles, with a width of ¾ to 1 mile, to Frog Rock. It then trends north-northwest for 1¾ miles, narrowing in places to 250 yards. It then expands northeastward into a basin about ¾ mile in diameter, from which the passage continues northward for 1 mile, with widths of 250 to 400 yards, to Fitz, Dippy, and Port Islands. **Mine Cove**, northeastward of Fitz Island, is ¼ by ½ mile in extent, with depths of 8 to 10 fathoms. Westward of the islands is the narrow entrance to a passage leading to Portlock Harbor (see page 216). The depths in Ogden Passage are moderate in places, but the bottom is generally rocky, and the only good anchorage is in Mine Cove.

Frog Rock is a steep, grassy rock about 35 feet high and is the outermost of a small group of islets on the northeast side of the passage. There is a deserted native village ½ mile eastward of it.

Snipe Rock, ⅝ mile south-southwestward of Frog Rock, is a flat, grassy rock about 10 feet high, part of a long, sunken ledge. It lies in the entrance to a narrow passage leading through Kukkan Bay to the sea, northward of Cape Edward (see page 215). A rock, bare at half tide, lies ¼ mile southeastward of Snipe Rock.

DIRECTIONS, KHAZ BAY AND TRIBUTARY WATERS.

Approaching Khaz Bay **from southeastward**, keep at least 1½ miles offshore until up to a position 1½ miles south-southwestward of Khaz Point and then steer 324° true (WNW mag.) with the inner and larger one of the two Outer Rocks in line with Black Islet; this range will lead about midway between Khaz Breaker and Middle Breaker. Other bare rocks show between Outer Rocks and Black

Islet, but the range marks are the most prominent and show well. Having stood 2½ miles on this course and Khaz Breaker is ½ mile on the port beam, steer 0° true (NNW ¾ W mag.) for 3 miles with Quit Point on range with Doolth Mountain ahead; a higher rugged peak will be seen just to the left of Doolth, and a two-peaked mountain (left one of a light color) shows to the right of Doolth, but these lie well back of it. When Deuce Island bears on the starboard beam, distant ⅝ mile, steer 58° true (NNE ⅜ E mag.), passing 250 yards southeastward of Nine-Foot Shoal buoy, or steer 20° true (N by W mag.) for 1 mile and pass 300 to 400 yards eastward of Guide Rock.

Approaching Khaz Bay **from westward**, pass 2 miles or more southwestward of Black Islet on a 138° true (ESE ½ E mag.) course, and when 3¼ miles past Black Islet, Outer Rocks should bear on the port beam, distant 1½ miles or more. Then steer about 76° true (NE mag.) and pass ¾ mile southeastward of Outer Rocks. When the latter are about ⅜ mile abaft the port beam, steer 31° true (N mag.) for a little over 3 miles, passing ⅜ mile eastward of Black and Gray Rocks, ¾ mile westward of Deuce Island, and to a position 300 to 400 yards eastward of Guide Rock; or, from Outer Rocks ⅜ mile abaft the port beam, steer 46° true (N by E ¼ E mag.), passing 250 yards southeastward of Nine-Foot Shoal buoy.

In **Slocum Arm** keep in mid-channel, taking care to avoid a rock 300 yards off the northerly shore a short distance inside the entrance.

In **Ford Arm** keep in mid-channel for nearly 2 miles to a buoy off a projecting point on the east side. Then pass in mid-channel eastward of the islands northeastward of the point. A shoal, with 2¼ fathoms over it and marked by a buoy, lies 350 yards off the point on the west side northward of the islands; above this the mid-channel is clear.

Going to **Klag Bay**, wait for slack water and keep in mid-channel through The Gate; when entering the narrowest part of The Gate, favor the westerly side abreast of a beacon in order to avoid a rock with 6 feet over it which lies 40 yards off the easterly side, and just beyond the beacon favor slightly the easterly side to avoid a ledge making out 50 yards from the point on the westerly side.

Or, from Guide Rock follow the Smooth Channel for about 2 miles until Elbow Passage opens; then enter the passage in 5½ fathoms on about a 100° true (ENE ⅛ E mag.) course, passing 30 yards northward of the first small islet. Keep the southerly shore aboard at a distance of 75 yards until abreast of The Gate.

From The Gate keep in mid-channel around the easterly side of Klag Island, being guided by the chart and the buoys; a strong current setting to or from Lake Anna may be expected when passing the entrance.

From the north end of Klag Island the chart is the guide. When within about ½ mile of Chichagof mining camp follow the westerly shore at a distance of 60 yards to insure passing westward of a rock with 5 feet over it which lies 175 yards southward from the southwest end of an island in mid-channel; this rock is usually marked by a barrel buoy.

In **Ogden Passage** the chart is a sufficient guide. Directions for Kukkan Bay and Portlock Harbor are given on pages 215 and 216.

ICY STRAIT AND CROSS SOUND

(charts 8302 and 8304) are the northernmost of the waterways connecting the inland passages of Southeast Alaska with the Pacific Ocean, and separate the mainland, between Point Couverden and Cape Spencer, from Chichagof and Yakobi Islands between Point Augusta and Cape Bingham. They are important as forming a connecting channel for vessels bound westward from the inland passages, and are generally used. Glacial ice from Glacier Bay is generally present in the passage, and may always be expected, and it is dangerous at night or in thick weather from Point Adolphus to Cape Spencer. Icy Strait is that portion of the passage eastward of Inian Islands; Cross Sound that westward. The distance, from Chatham Strait through the passage to the Pacific Ocean is about 60 miles; the average width is 4 to 7 miles, but in some places the width is much lessened by islands.

Hanus Reef is described on page 186.

On the south side of Icy Strait, 3½ miles westward of Point Augusta, is an inlet with a length of 1 mile in a west-southwesterly direction. It does not afford anchorage for vessels because of the great depth of water. At its head there are two short arms; the southern one is filled by a flat; the northern one has depths of 4 and 5 fathoms, and small craft can select anchorage in it. The shores at the entrance are foul and a mid-channel course should be followed.

Spasskaia Island lies 2 miles south-southeastward of The Sisters and 1¾ miles from the southern shore. It is small and divided at high water; the northern and larger part is 30 feet high, and has three trees, the tallest being umbrella-shaped. A reef, showing well in places at low water, extends ⅜ mile southeastward from it. A detached rock, bare at low water, lies ⅝ mile east-southeastward of the island. The passage south of Spasskaia Island is about 1 mile wide and has deep water, and may be used to advantage when bound eastward against strong easterly or southeasterly winds, and a head tide. If using this passage avoid a reef, showing well at low water, extending ½ mile from shore ¾ mile westward of Neck Point.

Spasskaia Bay is on the south shore, southward of Spasskaia Island. Pulizzi Island, wooded, lies on the east side at the entrance; the water is shoal between it and the shore. Neck Point, the western point at the entrance, is wooded and connected with the main shore by a bare spit. A shoal, with 3¼ fathoms and scattered kelp, lies ⅝ mile east-northeastward of Neck Point. There is anchorage, exposed to northeast only, in the middle of the western end of the bay with Neck Point bearing east-northeastward in 9 to 10 fathoms.

Entering from eastward pass ¼ to ⅜ mile northward of Pulizzi Island and steer west-southwestward for the middle of the entrance. From westward pass northward of the reef, bare at low water, extending nearly ½ mile from shore, ¾ mile westward of Neck Point, and then round Neck Point at a distance of ¼ to ⅜ mile.

The Sisters lie near the middle of Icy Strait 11 miles westward of Point Augusta. The group is ⅞ mile long in a northwesterly direction, and is two islands connected at low water, but they appear as three wooded islets, the northern one (about 150 feet high) having more than twice the length of the other two. A shelving ledge

extends ¼ mile from the north end of the group, and a sunken ledge extends 250 yards from the southeast end.

Sisters Reef lies 1⅛ miles west-southwestward of the north end of The Sisters and 1½ miles westward of the southeast clump of trees of the group. The reef is bare at low water in two heads and has no kelp. At times the tidal current has a velocity of 2 or 3 knots over the reef.

Port Frederick is described on page 231. On the east side of the port, 4 miles within its entrance, is **Hooniah Harbor**, the best and most convenient anchorage in this part of Icy Strait.

Flynn Cove, on the south side, 3½ miles west of Hooniah Island, has an anchorage in its eastern part 600 yards in extent in 8 to 12 fathoms. A shoal extends 300 yards north-northwestward of the west end of the high, wooded peninsula forming the northeast side of the cove. Harry Island, small and wooded, lies in the entrance 600 yards westward of this point. A half-tide reef lies 600 yards west-southwestward of Harry Island.

The best entrance is between Harry Island and the point east of it, favoring if anything Harry Island. At low water the entrance from westward, passing in mid-channel south of the half-tide reef, may also be used.

Pinta Cove, the bight on the east side of Point Adolphus, has been used as a temporary anchorage, but it is not recommended.

Swanson Harbor (shown on subsketch on chart 8302) is formed by a group of islands and reefs off the extreme southeast point of the mainland at the junction of Icy Strait with Chatham Strait and Lynn Canal. It affords good anchorage and shelter. Its north side is formed by Couverden Island and a small island between its western end and the mainland, all connected at low water. The south side is formed by Entrance and Ansley Islands and their associated rocks; the passages between them and between Ansley Island and the mainland are dry at low water and filled with rocks.

Couverden Island and associated islands appear from most points of view as a long, low, wooded point, the southeast point of which is Point Couverden. **Rocky Island**, grass covered and 54 feet high, lies ¾ mile southeastward of Point Couverden and is marked by a light; there is deep water around it as close as 250 yards, but a reef extends ¼ mile off Point Couverden toward the islet.

Sharp Ledge lies 200 to 400 yards northeastward of the east end of Entrance Island, and a ledge also extends nearly ½ mile from the east end of Entrance Island toward Rocky Island. These ledges are covered at half tide and marked by kelp.

No Use Ledge, bare at one-quarter ebb, lies on the north side of the anchorage ⅜ mile west-northwestward of the west end of Couverden Island.

To enter Swanson Harbor, bring Rocky Island astern on a west-northwesterly course, and follow the south shore of Couverden Island at a distance of about 250 yards until Entrance Island is passed. Then steer a mid-channel course until up with the western end of Couverden Island. Then follow the shore of Ansley Island at a distance of about 250 yards to the anchorage. Anchor with the north side of Entrance Island just open from the north side of Ansley Island, and with the west end of Ansley Island bearing

south-southwestward, distant ¼ mile, in 14 to 16 fathoms, soft bottom.

Porpoise Islands, 16 miles westward of Rocky Island, are surrounded by foul ground in places to a distance of nearly ¼ mile. A rock, covered at half tide, lies 400 yards off the southwest point of the southernmost island. Anchorage in about 15 fathoms, muddy bottom, can be had ¼ mile northwestward of the rock, with the tangents of the island bearing 31° true (N mag.) and 125° true (E ⅜ S mag.).

Excursion Inlet is a deep narrow inlet in the northern shore of Icy Strait, with its entrance northward of Porpoise Islands. It has a northwesterly direction, a length of about 9 miles, and is deep and clear. At 2½ miles inside the entrance there is a broad, grassy flat on the northeast side. There is a cannery on the point above the broad, grassy flat and 2 miles below the point separating the two arms of the inlet. At 4½ miles inside the entrance the inlet divides into two arms. A rock with 3 feet over it lies 250 yards off the eastern side of the point separating the two arms, and bears 80° true (NE ⅜ E mag.) from the point; the range of the cannery near the head of the east arm open from the west shore of the arm leads eastward of the rock. On the eastern side of the eastern arm, 2 miles above the dividing point, is a projecting point, with a cannery and wharf. The latter has a depth of 18 to 20 feet at its end, and fresh water can be obtained through pipe. Vessels will find indifferent anchorage near the head of the east arm, ⅝ to ¾ mile above the cannery and ¼ mile from the eastern shore, in about 30 fathoms. There is a sawmill on the western arm. Small craft can select anchorage in the coves at the head of the west arm in not less than about 10 fathoms.

Icy Passage is the channel between Pleasant Island and the northern shore. The northwest side of the passage has extensive flats, the southeast edge of which lies about ⅝ mile northwestward of a rock, awash at high water, lying 400 yards off the north end of Pleasant Island. For a distance of 1½ miles eastward of the rock and ¾ mile westward of it, shoals and broken ground extend about ¼ to ½ mile off Pleasant Island; between these shoals and the edge of the flats opposite the channel has a least width of about ½ mile. Vessels should proceed with caution when in the vicinity of these shoals. A bare rock lies 250 yards off Noon Point, the eastern end of Pleasant Island, and a rock, bare at low water, lies nearly ¼ mile southeastward of the bare rock. On the northwest side of Pleasant Island, 1 mile from its western end, is a small bight off which anchorage can be had about ¼ mile from shore in about 10 fathoms; the shore eastward and westward of the bight should be given a berth of over ¼ mile.

Pleasant Island Reef, lying 1 mile southward of Pleasant Island, is partly bare at extreme low water. Depths of 5¼ to 7 fathoms are found for a distance of ⅜ mile southward of the reef, and 2½ to 3 fathoms for ½ mile north-northeastward. The line of the west end of Porpoise Islands and the southeast side of Pleasant Island leads a little southeastward of the reef, and its south side lies east-southeastward of the southwest side of Pleasant Island. Broken ground, with 7 fathoms in places, extends 1 mile westward of the

reef to a 3½ fathom patch lying southeastward of the western end of Pleasant Island.

Glacier Bay is described on page 232.

Mud Bay is a large bight in the southern shore of Icy Strait 7 miles south-southwestward of Point Adolphus and 4 miles southeastward of Lemesurier Island. The south side of the bay is filled by a flat which extends out about ⅝ mile from the low spits at its head. The southwest side of the bay is formed by several low wooded islands connected with the shore at low water, the western one of which is **Goose Island.** Foul ground, bare in places at low water and marked by kelp, is reported to extend about ½ mile off the northwest end of Goose Island. At the northeasterly end of the foul ground a reef, with 12 feet over it, is reported to lie about ⅝ mile north-northwestward of the northeasterly end of Goose Island. The reef and rock are in the way only when approaching from westward. Anchorage can be had in Mud Bay about 1 mile from its southern end in 6 to 9 fathoms, but it is exposed from north to west and there is sometimes considerable ice. A good berth is with the eastern shore northward of the bay in line with the western end of Point Adolphus, bearing north-northeastward, and the north end of Goose Island in line with the north side of Inian Islands, bearing westward, in about 8 fathoms.

Idaho Inlet has its entrance on the southern shore eastward of Inian Islands, where it is 3½ miles wide. **Shaw Islands,** two in number and wooded, lie on the western side nearly 2 miles within the entrance. The islands are connected by a ledge, but there is a good channel on either side of them. Above Shaw Islands the inlet is 1¼ miles wide, narrowing to ½ mile, and extends 8 miles in a southeasterly direction to two wooded islets near the southern side, above which are flats bare at low water. A mid-channel course leads safely to the head of the inlet, where there is anchorage in the middle about ⅜ to ½ mile below (westward of) the two wooded islets, in 18 fathoms, muddy bottom.

From the eastern point at the entrance to Idaho Inlet a shoal extends nearly 400 yards southwestward. On the eastern shore of the inlet just south of this point is **Gull Cove,** in the entrance of which anchorage can be made in 15 fathoms. A small vessel at low water can select an anchorage closer in, in about 9 fathoms, with better shelter from northerly winds. Ice seldom enters the cove, and water can be obtained by boats. There is a cannery on the eastern side of the inlet about 3 miles southward of Gull Cove.

South Inian Pass, connecting Icy Strait and Cross Sound southward of Inian Islands, is little used, although it is more direct than North Inian Pass for vessels going to Port Althorp. It is nearly 3 miles long and varies in width from about 1 mile at its eastern end to ⅜ mile at its western end at Point Lavinia. Broken ground with depths of 10 to 30 feet extends 200 yards northwestward of Point Lavinia. A rock with 8 feet over it lies at the eastern entrance to the pass, ⅞ mile 67° true (NE ¾ N mag.) from the western point at the entrance of Idaho Inlet.

There are no dangers in South Inian Pass proper, and no anchorage. Ice drifts through at times. The velocity of the tidal currents exceeds 6 knots at times, being greater than in North Inian Pass, and

heavy, dangerous tide rips occur especially at the western entrance with an ebb current and westerly or southwesterly wind. **South Rock** and **Dad Rock** are bare at low water and marked by kelp; the former is in the middle of the entrance to the open bay on the south side of the pass, and the latter is in the entrance to the irregular bay on the northern side of the pass 300 yards south-southeastward of an islet.

Earl Cove is the indentation about 400 yards wide in the eastern side of Inian Islands. It is clear, and a small vessel may anchor here temporarily in 10 to 15 fathoms; but it is exposed eastward, and generally has considerable ice.

Inian Cove (subsketch on chart 8304), on the northwest side of Inian Islands, is a secure anchorage with a clear width of 600 yards. Its entrance is 1¾ miles east-northeastward of the northwest point of the northwest Inian Island. The cove is 1 mile long, 375 yards wide in its narrowest part, and ⅜ mile wide at its head. The north point at its entrance is a small grassy islet with steep rocky sides. Kelp grows in deep water on both sides in the entrance. Ice drifts into the cove, usually along the south side, but is not considered dangerous to vessels at anchor.

Approaching from eastward pass northward of foul ground extending ¼ mile off Inian Islands ½ mile eastward of the entrance to the cove. From westward the approach is clear. Enter in midchannel and steer eastward so as to keep the north shore aboard, distant 100 yards, in the narrowest part of the cove. Anchor in the wide part of the cove in 7 to 9 fathoms, soft bottom.

Dundas Bay has its entrance on the northwest side of Icy Strait, north-northwestward of Inian Islands. The main bay is about 2 miles wide and 4 miles long in a northwesterly direction. The northern end is filled by flats to a distance of 1¼ miles from its head, between which is a channel of very deep water leading northward toward the mouth of the stream at its head. Westward of the flats is a channel along the southwest shore of the bay leading into the narrow crooked inlet, which extends 5 miles in a westerly direction, and then turning abruptly southward reaches to within 1 mile of Taylor Bay, with low land between.

At 3 miles within the entrance is a wooded islet about 150 yards from the southwest shore, and about ¼ mile above the islet are a cannery and wharf. Fresh water can be had at the wharf through pipe. There is anchorage about ¼ mile off the cannery in 8 to 12 fathoms, sticky bottom, and the only danger is the flat opposite, which lies ⅝ mile northeastward from the cannery and the islet. The anchorage is exposed southeastward and heavy ice drifting with the current is sometimes troublesome. At the anchorage the tidal currents have an estimated maximum velocity of 2½ knots.

Taylor Bay has its entrance on the northwest side of Cross Sound 3 miles westward of Inian Islands and 6 miles northward of Cape Spencer. **Brady Glacier**, with a mud flat 1½ miles in front of it, is at its head and is conspicuous. The bay is 5 miles long, 2½ miles wide, open southeastward, exposed to the Pacific swell, and has no secure anchorage. **Taylor Islands**, high and hummocky, form its northeast side for 2¾ miles from the entrance; a bare rock lies off the southeast end of the islands. The bight in the northeast shore of the bay above the islands is foul. A shoal, with 18 feet and marked by kelp,

lies ¾ mile from the southwest shore of the bay and 2⅛ miles west-southwestward of the bare rock off the southeast end of Taylor Islands. The southwest side of the bay is shoal for ½ mile from shore.

Port Althorp is described on page 236.

Lisianski Inlet and **Strait** are described on page 218.

An area about 1 mile in diameter with depths of 9 to 12 fathoms lies in Cross Sound 3¾ miles southwestward of the northwest end of Three Hill Island and 2¾ miles west-northwestward of the entrance to Lisianski Inlet.

Cape Spencer, the northwest point at the entrance to Cross Sound, is conspicuous. Its extremity is formed by a number of islets, some having scattering trees, which appear as a low point, from which the cape rises by an upward sweep to the summit of the mountains back of the cape. The islets extend 1¼ miles south of the cape, and have deep water as close as ¼ mile.

Cape Spencer Light is an unattended flashing white light (light 2 seconds, eclipse 8 seconds) on one of the small outer bare islets off the cape; the light is 90 feet above the water, and visible 11 miles.

Cape Bingham forms the southeast point at the entrance to Cross Sound. The point is rather low, rocky, and bordered by small islets. From Cape Bingham the shore of Yakobi Island trends northward and eastward about 5 miles to Soapstone Point, the western point at the entrance to Lisianski Inlet.

Glacial ice in varying quantities is prevalent in Icy Strait and Cross Sound throughout the year. The ice comes from Glacier Bay, and the most of it is usually found at Glacier Bay entrance and from there to Inian Islands. It is often quite thick in Cross Sound and has been seen 10 or 15 miles seaward of Cape Spencer and as far eastward as Point Augusta. The size of the pieces is sufficient to make them dangerous to navigation.

The **tidal current** on the flood sets through Cross Sound and Icy Strait from the ocean and meets the flood in Chatham Strait southward of Point Augusta; the ebb sets in the opposite direction. The velocity varies with the range of tide and width of the passage. In the wider portions of Cross Sound the estimated maximum velocity is about 2½ knots. Between Inian Islands and Point Wimbledon the velocity is possibly 6 knots at times, and, when strongest, heavy swirls and rips occur at the northwest end of the northwest Inian Island which, with the large tides, extend clear across. South of Inian Islands, in the narrowest part of the passage between them and Point Lavinia, the velocity exceeds 6 knots at times, and heavy dangerous rips and swirls occur, especially with an ebb current and westerly or southwesterly winds. In Icy Strait eastward of Inian Islands the estimated maximum velocity is 2 to 3 knots. There are swirls and tide rips at times off the entrance of Glacier Bay. At Point Augusta the tidal currents usually have little velocity. At Inian Islands there is an overrun which it is believed does not exceed one hour.

PORT FREDERICK

(charts 8302 or 8304) is an extensive estuary, the entrance to which is on the south side of Icy Strait, 5½ miles southwestward of The Sisters and 14 miles eastward of Point Adolphus. It has a general southerly direction to its head, where there is a short portage to

Tenakee Inlet. The greater part of the port is unknown but on the eastern side 4 miles within its entrance is Hooniah Harbor, the best and most convenient anchorage in this part of Icy Strait. The main entrance to the port is 1⅝ miles wide between Point Sophia and Pinta Rock. In entering from westward the passage south of Hooniah and Scraggy Islands, about ½ mile wide, may be used.

The western point at the entrance is marked by two islands, about ⅝ mile off its north side. **Hooniah Island**, the western and larger one, is 270 feet high and well wooded; a reef with 12 feet over it extends ⅜ mile northwestward of the west end of Hooniah Island. **Scraggy Island**, 40 feet high and sparsely wooded, lies about ¾ mile east of Hooniah Island; a rock, bare at half tide, lies midway between Hooniah Island and Scraggy Island. **Pinta Rock** is a sunken rock 300 yards in extent, with 12 feet over it and marked by kelp for about two-thirds of its length. It lies ¾ mile east-southeastward of Scraggy Island and about on the line of the south sides of Scraggy and Hooniah Islands.

Halibut Island lies ½ mile from the west side, 1 mile inside the entrance to the port. It is wooded, and foul ground extends ¼ mile northeastward from it. Halibut Rock, bare at half tide, lies ⅝ mile south-southeastward of Halibut Island. There is kelp for a distance of about 100 yards west and southwest of the rock, but none on its east side.

Point Sophia shows from eastward a wooded hill 560 feet high, somewhat bluff at the water; southward of the hill is a V-shaped saddle, from which it rises to high land. From Point Sophia to Inner Point Sophia the shore is free from dangers.

Inner Point Sophia, on the east side, 2 miles south-southwestward of Point Sophia, is similar in appearance to Point Sophia but lower, and is marked by a light. The water is shoal for a distance of about 100 yards around the point. A short distance inside of Inner Point Sophia there is a cannery and wharf.

Hooniah Point, ¾ mile southeastward of Inner Point Sophia, is a rocky bluff wooded on top.

About ¾ mile southeastward of Hooniah Point is the western end of **Pitt Island**, the northern one of several islands near the eastern shore. The island is wooded and 125 feet high.

Hooniah Harbor lies east of Hooniah Point and between Pitt Island and the northern shore. **Hoonah**, a post office, native village, store, and wharf, is on the north side of the harbor; there is regular communication by small craft with Juneau. The anchorage is between, or a little inside, the western end of Pitt Island and the western end of the village, in 12 to 14 fathoms, soft bottom. The anchorage is not well protected from southwest, but the holding ground is good. Broad gravel beaches extend from the north side of Pitt Island and off the village. A bar, with about 6 feet over it, connects the east end of Pitt Island with the main shore eastward.

The **tidal currents** in the narrow part of the entrance to Port Frederick have an estimated velocity of 1½ to 3 knots.

GLACIER BAY

(chart 8306) has its entrance on the northern side of Icy Strait between Point Gustavus and Point Carolus. It is about 35 miles long

to the head of Muir Inlet and 52 miles long to the head of its northwest arm, and varies in width from 2 miles at Beardslee Islands to 9 miles at its widest part above Willoughby Island. From Point Gustavus to Willoughby Island, the eastern shore, including Beardslee Islands, is low and quite shelving, and the western shore is low for a short distance back; above Willoughby Island both shores of the bay are steep and high. Numerous discharging glaciers enter the bay, and glacial ice is always present, sometimes in enormous quantities. The bay is frequently entered by steamers for the purpose of viewing the glaciers. The navigation of Glacier Bay is not considered safe without the aid of local knowledge. The shoals are usually marked by ground ice.

Ancon Rock, with 11 feet over it and showing some kelp at slack water, lies ½ mile southward of Point Gustavus. Broken ground, with depths of 5 to 6½ fathoms and a possibility of less, extends 1¼ miles south-southeastward of Point Gustavus; it should be avoided by vessels.

Point Carolus is a low, bare, gravel and bowlder point, with low wooded land behind it and high land about 1 mile back. A shoal extends ½ mile east-southeastward from the point.

Beardslee Islands, low, hilly, and sandy, begin 4 miles above Point Gustavus and extend along the eastern shore to within about 3 miles of Willoughby Island; they should be given a good berth. Their southwest and west sides are quite shelving, and there are detached shoals north-northwestward of them a considerable distance, one of which bares several feet. Beyond these islands the eastern side of the bay has shoals and sand dunes formed by the glacial débris from the head of the bay; many of these shoals show only at low water, and some of them are never uncovered.

Willoughby Island is a mountain of bare rock, 1,597 feet high and 3½ miles long. Three small islets lie close to its north end.

Francis Island is a comparatively small and low bare rock, 1¼ miles west-northwestward of Willoughby Island, with a deep channel between.

Drake Island, similar to Willoughby Island and over 1,000 feet high, lies ⅝ mile west of Francis Island.

Marble Islets, about 70 feet high and bare, are 1¼ miles apart, and the southeast one lies 3 miles north of Willoughby Island.

Sturgess Island, bare and higher than Marble Islets, lies 3 miles north-northwestward of North Marble Islet.

Sebree Island, close to the west side at the entrance to Muir Inlet, is bare and about 250 feet high.

Garforth Island lies on the east side of Muir Inlet 2¾ miles northeastward of Sebree Island. Caroline Shoal lies between them and about 1 mile from Sebree Island.

Bartlett Cove, 4 miles north-northwestward of Point Gustavus, is formed by the mainland on the southeast and Beardslee Islands on the northwest, is large, and affords good anchorage. It is open southwest, but the holding ground is good. Occasionally ice gets into the bay, and is at times troublesome to vessels at anchor. The best anchorage in the cove is about ¼ mile off the southeast side in 7 to 10 fathoms, muddy bottom, care being taken to keep clear of a spit which extends about ¼ mile west-southwestward of the grassy island at the head. The water on the northwest side of the cove is

deeper, and vessels anchoring off the village must go close in to get 25 fathoms. Water can be obtained at the mouth of a stream in a bight on the southeast side.

To anchor in Bartlett Cove, follow the eastern shore of Glacier Bay at a distance of 1 to 1½ miles for 4 miles from Point Gustavus to the entrance of the cove, course about 20° true (N by W mag.), and enter in mid-channel. A bowlder reef, largely bare at low water, extends about 300 yards from the east point at the entrance.

Berg Bay, on the southwest side of Glacier Bay 10 miles above the entrance, is a good anchorage with a clear width of ⅝ mile. The entrance is nearly ¼ mile wide between two islands, with a least depth of 4¼ fathoms, and lies 2 miles southward of the southeast end of Willoughby Island. The southeast island is joined to the shore at low water, and for a distance of ⅝ mile inside it a shoal makes off ¼ mile from the southeast shore. Shoals also extend ¼ mile from the western shore of the bay. The northwest island is separated from the shore northwestward by a narrow channel suitable for small craft only.

Heavy ice grounds at the entrance and may at times render it impracticable to enter or leave. With continued easterly winds Berg Bay is filled by the smaller bergs. Ordinarily the bay is comparatively free from ice, and it is considered to be less troublesome to vessels at anchor than in Bartlett Cove.

Approaching from southeastward the island on the southeast side at the entrance shows detached from the shore and is readily identified. To enter, keep the northwest side at the entrance best aboard, distant about 250 yards, and steer southwestward for the prominent point on the northwest side where the bay narrows and changes direction westward. When ¾ mile inside the entrance haul southward and anchor about ¼ mile from the southeast shore, where a steep mountain comes down to the water, in 6 to 8 fathoms. The shore at the anchorage is steep-to, and the tidal currents have little velocity.

Muir Inlet had a length of 13 miles in 1907, the glaciers at its head having receded 7½ miles since the previous survey, and no sounding has been done in this part of the inlet. The heavy ice floats off, however, and it is presumed to have deep water, with the exception of Caroline Shoal.

Caroline Shoal extends 1⅜ miles from the western side of Muir Inlet just above Sebree Island. The end of the shoal is a gravel and bowlder spit, 200 or 300 yards in extent and bare a few feet at low water, and lies 1⅛ miles east-northeastward and northward, respectively, from the northwest and southeast ends of Sebree Island.

Northwest arm of Glacier Bay has a west-northwesterly direction, with a width of 2 to 5 miles. **Lone Islet** lies in mid-channel 3⅜ miles west-northwestward of Drake Island. **Geikie Rock**, bare at half tide, lies off Geikie Inlet, 1¼ miles northeastward of the western point at the entrance and 1¾ miles south-southeastward of Lone Islet. A rock bare at lowest tides lies close southeast of it, and the grounded ice in the vicinity indicates a shoal of some extent. No sounding has been done in **Geikie Inlet**. **Hugh Miller Inlet** is shoal. A line of soundings through Glacier Bay, favoring somewhat the north side, gave depths of 80 to 120 fathoms to Composite Island, which lies on

the north side 13 miles westward of Lone Islet. At this point the arm divides into three inlets.

Reid Inlet has a westerly direction for 12 miles to Johns Hopkins Glacier, at the head of its south arm, and a length of 15 miles to Grand Pacific Glacier, at the head of its north arm. No sounding has been done. The north side of the inlet is reported to be shoal to the large island 5 miles above its entrance.

Rendu Inlet has a northwesterly direction for 8 miles, with a width less than ¾ mile and depth 75 to 100 fathoms. It is occasionally entered by excursion steamers.

Queen Inlet has a north-northwesterly direction, curving northward at its head for about 7 miles, a width of 1¼ miles, and depths of 40 to 75 fathoms. Depths of 15 to 20 fathoms are found eastward of Triangle Island, 3½ miles above Composite Island. There are depths of 35 to 45 fathoms west of Composite Island; no sounding has been done east of the island. The inlet is occasionally entered by excursion steamers.

Ice.—Beginning in September, Glacier Bay is frozen during the winter as far down as Willoughby Island. The greatest amount of floating ice is found in the spring, and it lessens as the season advances. In June the ice in front of the glaciers, as seen from mountains farther down, appears to be solid at the head of the bay. More ice comes down the bay on the large tides than the small, and winds also exert a marked influence on the ice movements. A southwest wind drives the ice into Bartlett Cove, and a north wind, which blew steadily for a week in September, 1907, blocked the channel westward of Drake Island, which to that time had been open all the season.

Usually the great mass of ice from Muir Glacier is congested in Muir Inlet and out into the bay to South Marble Islet, leaving the southwest shore from Willoughby Island to Hugh Miller Inlet comparatively free from ice.

The ice from Brady, Johns Hopkins, and Grand Pacific Glaciers is usually congested in Reid Inlet, and thence drifts along the south shore to Hugh Miller Inlet. Here it sets across toward the north shore, but is generally so scattered that vessels usually have little trouble in passing through the ice belt to the comparatively free north shore above.

In 1907 the excursion steamers went to the heads of Rendu and Queen Inlets, and late in the summer succeeded in going to the head of Muir Inlet.

The tidal currents from Point Gustavus to Willoughby Island have an estimated velocity of 6 knots at times. Heavy tide rips and swirls occur abreast Beardslee Islands, especially off the channel southeastward of the northwest island of the group. From this channel the ebb current sets across the bay and meeting the direct current coming down on either side of Willoughby Island produces heavy swirls and rips during large tides, especially dangerous when the ice is thick. The ice in the swirls moves in all directions with varying speed, and it is nearly impossible to get through without striking if the ice is thick. The water is shallow enough to ground the largest bergs, forming temporary dangerous obstructions in places. The floating ice rushes past these grounded bergs with great velocity. Above Willoughby Island the currents have little velocity.

In approaching the entrance to Glacier Bay, Point Gustavus should not be approached closer than 1¼ miles to clear Ancon Rock and the broken ground southeastward of the point. Enter in mid-channel between Point Gustavus and Point Carolus, and steer for Willoughby Island, passing in mid-channel southwestward of Beardslee Islands. Depending on the ice, Willoughby Island may be passed on either side. If passing northeastward, follow its northeast shore at a distance of ½ to ¾ mile. When up with the middle of the island steer about northwest by north for Muir Inlet and pass ¾ to 1 mile westward of Marble Islets, Sturgess Island, and Garforth Island. Or, from a mid-channel position between Willoughby and Francis Islands, the course to Muir Inlet is north-northwestward. When entering Muir Inlet pass 1½ to 2 miles eastward of Sebree Island and keep Garforth Island aboard, distant about ¾ mile, to clear Caroline Shoal.

The passage southwestward of Willoughby, Francis, and Drake Islands and Geikie Rock is sometimes comparatively free from ice, and may sometimes be used to advantage if going to the western head of the bay. Follow mid-channel courses, and when passing Geikie Inlet keep the south shore aboard, distant not over ¾ mile, to avoid Geikie Rock. From Hugh Miller Inlet the thickest ice may at times be avoided by crossing to the north shore and following it to Queen and Rendu Inlets.

Bartlett Cove and Berg Bay are the only known anchorages.

PORT ALTHORP

(chart 8304) has its entrance on the eastern side of Cross Sound, 7 miles east-northeastward of Cape Spencer. From its entrance the port has a length of 7 miles, east-southeastward, and a width of 1½ miles in its lower part, narrowing to ½ mile at its head. At its head there is a good anchorage, the best in Cross Sound, but it is somewhat out of the way, and Inian Cove or Dundas Bay may prove more convenient. The main entrance to the port is between Gaff Rock and Three Hill Island and is nearly 1 mile wide. There is a clear passage about ½ mile wide between George Islands and Point Lavinia.

George Islands are the group of wooded islands on the north side at the entrance. They are about 1 mile in diameter and 300 feet high at the southwest end. North and west of George Islands are a number of high, bare rocks. **Gaff Rock**, 20 feet high, lies ⅜ mile southwestward of George Islands and there is no safe passage between. A kelp patch lies eastward from Gaff Rock and southward from George Islands; a sounding of 6¼ fathoms was made at the southeast end of the kelp ½ mile east-southeastward of Gaff Rock.

Three Hill Island, about 1 mile south-southeastward of George Islands, is 1½ miles long in a southeasterly direction. Its three wooded hills are 600, 1,000, and 400 feet high and united by low isthmuses; its southwest shore is fringed with rocks. Between this island and Point Lucan are two small wooded islets and some rocks; there is a narrow passage southeast of the wooded islets.

Althorp Rock, about 15 feet high, lies in the middle of Port Althorp 1¾ miles eastward of the northwest end of Three Hill Island. It

is surrounded by other rocks which cover, and by kelp for a considerable distance, especially on its south side. At nearly ½ mile southwestward of this rock is a considerable group of rocks, a number of which show several feet at high water.

Granite Cove, on the southeast side of George Islands, is about 400 yards in extent, and small craft or very small vessels can anchor in fine weather toward the southeast side at the head in 15 fathoms, gravelly bottom. A shoal extends 150 yards from the southwest side. The cove is contracted and open southward, and except for temporary purposes is not recommended. The shores are mostly rocky, with outlying kelp patches, but the small isthmuses have sandy beaches where boats can land in moderate weather.

At 5 miles within the entrance to Port Althorp there is a small round wooded island in the middle of the port, and the passage to the anchorage at the head of the port is on its north side. At ¼ mile east of the island the port narrows to ⅓ mile, and then expands into a basin about ⅜ by 1 mile in extent. Good and well-protected anchorage can be made here in 15 to 20 fathoms, blue mud bottom. The head of the basin is filled by a flat about ½ mile wide, and a stream enters at its southeast corner.

Vessels entering **Port Althorp** from South Inian Pass can pass eastward of the George Islands. Entering from any other direction, they usually pass between Three Hill Island and Gaff Rock. Going to the anchorage at the head, they pass eastward of Althorp Rock and the rounded wooded islet 3¼ miles above.

COAST FROM CROSS SOUND TO YAKUTAT BAY.

From Cape Spencer the coast trends in a general westerly direction to Ocean Cape, a distance of about 128 miles. The Fairweather Mountains lie on the mainland from about 20 miles northwestward of Cape Spencer to Alsek River. These mountains are snow-covered, have elevations from 10,000 to over 15,000 feet, and present a spectacle of great grandeur. From Alsek River to Yakutat Bay the mountains range from 4,000 to nearly 6,000 feet high. There are numerous glaciers with terminal moraines along the coast. The most conspicuous are: La Perouse Glacier, which comes down to the sea a few miles westward of Icy Point, its sea face being partly vertical, and at its highest point 200 or 300 feet high; those westward of Cape Fairweather; Yakutat Glacier, lying 25 miles eastward of Yakutat Bay; and the great ice field of Malaspina Glacier, westward of Yakutat Bay. There are no known outlying dangers along the coast.

Cape Spencer, the northwest point at the entrance to Cross Sound, is conspicuous. Its extremity is formed by a number of islets, some having scattering trees, which appear as a low point, from which the cape rises by an upward sweep to the summit of the mountains back of the cape. The islets extend 1¼ miles south of the cape and have deep water as close as ¼ mile.

Cape Spencer light is an unattended flashing white light (light 2 seconds, eclipse 8 seconds) on one of the small outer bare islets off the cape; the light is 90 feet above the water and visible 11 miles.

Graves Rocks lie 5 miles westward of Cape Spencer and about 1 mile offshore. The north end of the group is an islet, wooded on top

and about 125 feet high. From the islet a series or group of large bare rocks extend south-southeast more than 1 mile, the outer one lying 4 miles west-northwestward of Cape Spencer. Rocks and kelp patches extend from the group to the mainland northeastward and fringe the shore to Cape Spencer.

Libby Island lies about 1 mile westward of Graves Rocks and nearly ½ mile from shore. It is a good-sized wooded island, probably 300 feet high, with some bare rocks between it and the point northward and a considerable area of bare rocks on its south side. Other rocks that cover and are usually marked by breakers extend out about ¼ mile south of the island.

Graves Harbor has its entrance between Graves Rocks and Libby Island. The description following is from an early reconnoissance. It extends 2½ miles north-northeastward, with an average width of 1 mile. There are three coves. The one on the west side just inside Libby Island has not been examined, but appears to be a bight open to the ocean. **Murphy Cove**, the southern one on the east side just inside the entrance, was not examined, but is reported to afford a snug anchorage for very small vessels; its entrance is narrow and rocky. The **northern cove** on the east side is a good landlocked anchorage, which is easily entered. It has its entrance at the head of the bay and extends about 1½ miles in a southeast by east direction, narrowing from about ⅝ to ⅜ mile. A large **kelp patch** extends about ¼ mile north-northwestward from the south point at the entrance to the anchorage. This is apparently the only danger in the harbor. The depths in the anchorage range from 12 fathoms at the entrance to 9 fathoms near the head, over a uniform muddy bottom. Fresh water can be obtained by boats.

Graves Harbor has not been surveyed, and caution is recommended in entering, as there may be sunken dangers not seen. The shores at the entrance are rocky. A sounding of 30 fathoms, no bottom, was made midway between Graves Rocks and Libby Island. **Enter** in mid-channel between Graves Rocks and Libby Island and steer 47° true (N by E ½ E mag.), which is the mid-channel course through the bay. In proceeding up the bay a small islet, with a few trees on top, opens detached from, but close to, the east shore. The turning point into the anchorage lies ¼ mile northward of it. Favor the northeast shore slightly in turning into the anchorage to avoid the kelp patch off the turning point, and when inside it select anchorage, as desired, in 9 to 11 fathoms. Vessels can proceed as far in as the narrow part at the head, anchoring abreast a bight westward of the first small islet on the northeast side in 9 fathoms.

The **bay** making northward west of Libby Island has not been examined. Two rocks, covered at high water, lie in the middle of its entrance.

Sugarloaf Island lies about 4 miles westward of Libby Island and 10 miles westward of Cape Spencer. It was named from its shape as seen from southeast, from which direction it shows as barely detached from the islet-like point northeast of it. It is over 700 feet high and well wooded. As seen from westward it has a uniform north slope; it south slope has a step and is separated by a deep V-shaped ravine from its small south end. Some bare rocks and

some that cover lie close to the island from south around to west. With moderate easterly gales temporary anchorage can be made in the middle of the rocky cove north of the island in 10 to 18 fathoms, rocky bottom. The cove is ⅜ mile wide and open southwestward.

Astrolabe Point lies 1¾ miles west-northwest of Sugarloaf Island. It is rugged, and its western face is bare cliffs to the top of the mountain. Its south face is moderately wooded halfway up. Off the south face of the point are a large number of bare rocks and some that cover extending out ½ mile.

Dixon Harbor (chart 8305) has its entrance between Sugarloaf Island and Astrolabe Point. Inside Astrolabe Point the harbor is 2 miles long in a general northerly direction, with a width of ¾ mile, and above its head is a glacier visible from the entrance. At its head is an extensive flat ¼ to ⅜ mile wide, which extends westward to the entrance of the northwest arm. The northwest arm is 1¼ miles long in a northwest by north direction and ⅜ to ¼ mile wide. The north point at its entrance is a grass-covered rock about 20 feet high, from which a shoal extends southward across the arm, leaving a channel close to the southwest shore 200 yards wide, with depths of 18 to 19 feet. The sea and swell from outside are well broken before reaching the entrance to this arm, and vessels have no difficulty in entering. The head of the arm is clear, with a depth of 7 fathoms, muddy bottom, and is a secure anchorage. Temporary anchorage can be made 300 to 400 yards northeastward of the south point at the entrance to the arm in 5 to 7 fathoms, soft bottom.

To enter Dixon Harbor, pass about ½ mile westward of Sugarloaf Island on a 31° true (N mag.) course, and when inside the entrance follow the west shore at a distance of about ¼ mile to the entrance of the northwest arm. Pass 150 to 200 yards northward of the south point of the arm on a 323° true (WNW mag.) course and then follow the southwest shore at a distance of 150 yards on an 8° true (NNW mag.) course until ⅜ mile above the grass-covered rock off the north point at the entrance. Continue the course until in midchannel, which is then clear to the head.

About 2 miles northwest of Astrolabe Point is a comparatively low wooded point, projecting southwestward from the foot of a retreating glacier. On either side of the point are bights, both of which are exposed southwest.

Icy Point, about 18 miles 308° true (W ⅝ N mag.) from Cape Spencer, is rather low and wooded, and from southeastward La Perouse Glacier is seen over it, both apparently sloping to the sea.

From La Perouse Glacier to Lituya Bay, a distance of about 15 miles, there is a range of low wooded hills, with some level land seaward of them. This low land increases in width westward and forms the east side of Lituya Bay.

Harbor Point, the southwest end of this low land, is the east point at the entrance to Lituya Bay. It lies about 40 miles 308° true (W ⅝ N mag.) from Cape Spencer, and 88 miles 130° true (E ¾ S mag.) from Ocean Cape. From southeastward it appears as a long low point, with some light elevations on it. From southward Harbor Point may be recognized by two small, rounded, wooded hills, which lie behind it northeastward, and have been called The Paps. There are many large bowlders scattered along the beach.

Lituya Bay (chart 8262).—Lituya Bay affords anchorage when once inside, but its entrance is dangerous and it should not be attempted except with local knowledge. Its entrance does not exceed 100 yards wide and leads between two spits. The eastern one extends 200 yards southwest from Harbor Point and is nearly all bare at low water and bold-to except Passage Rock. There are several high bowlders that must be bare at all times; the largest one of these, on the extreme southern edge of the spit, is called Cormorant Rock. Passage Rock is a sunken rock, and the only one noted on the east side by a Coast Survey party in 1874; it lies 100 yards west-northwestward of Cormorant Rock, and has 6 fathoms close-to.

The western point at the entrance is a spit 2 to 12 feet high, which extends ¾ mile southeastward from the western high headland of the bay. From its eastern end a shoal extends ⅜ mile south-southeastward, on which are large bowlders, some of which are bare at low water.

The entrance to the bay leads north-northwest for about 300 yards in its narrow part, and is about 100 yards wide in its narrowest part between Passage Rock and the danger line southwest of it, and has depths of 4 to 6 fathoms. The bay can be entered only with a smooth sea and at slack water, and the safest time is low-water slack.

Anchorage Cove affords a convenient anchorage when once in the bay. It is on the north side of the western spit, is about ¼ mile in extent, and has depths of 5 to 7 fathoms, hard, sandy bottom. Elsewhere in Lituya Bay the water is generally much deeper.

The Tidal Currents at the entrance have an estimated velocity of 10 knots. The ebb current running out against a southwest swell causes bad topping seas or combers which are dangerous. Slack water lasts from 10 to 20 minutes. The sea breaks entirely across the entrance, except with a smooth sea.

Sailing Directions of practical value can not be given for entering Lituya Bay. It should not be attempted except with good local knowledge or after a careful examination.

Cape Fairweather, about 16 miles west-northwestward of Harbor Point, is an evenly rounded point, with an elevation behind it, sloping gently to the sea and abruptly to the mountains. The summit of the cape is bare of vegetation and is covered with large heaps of glacial drift piled irregularly, some of it of a bright iron-rust red color.

Dry Bay, the delta of Alsek River, is 12 miles long fronting the ocean, and extends back about 7 miles. It is mostly covered at high tide, but at low tide is filled with bars and small islands between which are ramifying channels all constantly changing. The only permanent feature in the delta appears to be a wooded island about 200 feet high near the middle of the bay, which in line with Alsek Glacier bearing northeast leads close to the western entrance. There are three entrances from sea, but neither the depth nor position can be depended on, and inside each is a lagoon several miles in extent.

In recent years the western entrance, lying 45 miles eastward of Ocean Cape, has been used to some extent by small craft, it having a width of about 400 yards and a depth of about 6 feet at low water. The natives state that the current usually sets out and that an anchorage may be made by small craft in from 8 to 9 feet inside the bar at the western entrance. The current has a velocity of about 2½ knots

on the falling tide. No directions can be given. The best time to enter is on a rising tide near high water, and a smooth sea is essential. During heavy weather the sea breaks fully 2 miles offshore.

From Dry Bay to Yakutat Bay the mountains lie from 5 to 14 miles from the coast, and between is a low wooded plain, traversed by numerous streams, many of which are connected. At high water, by making long detours, a canoe can be taken through between Dry Bay and Yakutat, but there are several portages and the route is impracticable for a boat of any size. The principal rivers, with their approximate distances, eastward of Ocean Cape are: **Ustay**, 32½ miles; **Italio**, 23½; **Dangerous**, 21; **Ahrnklin**, 15; and **Situk**, 12 miles. All of them have shifting bars at their entrances and a lagoon or tidal basin inside, and are suitable only for boats or launches at high water with a smooth sea and local knowledge. There is a fishing station on the Situk from which there is a railroad to the cannery at Yakutat.

The mountains which bound this plain carry numerous glaciers. **Yakutat Glacier**, lying 28 miles eastward of Ocean Cape, is 3 miles wide and the most noticeable.

YAKUTAT BAY

(chart 8455) has its entrance between Ocean Cape and Point Manby, where it is 16 miles wide. It has a northerly direction for 15 miles, where it is 10 miles wide between Blizhni Point and Knight Island, and continues in the same direction for 8 miles farther to Point Latouche, where it is 3 miles wide. The continuation northward is known as Disenchantment Bay. Yakutat Bay is important as affording good anchorage (Yakutat Roads), the best between Cape Spencer and Prince William Sound. The bay is clear of islands and dangerous shoals, except along its eastern shore from Ocean Cape to Knight Island. The east shore, from the north end of Khantaak Island nearly to Point Latouche, should be approached with caution.

The depths in the bay are irregular, ranging from 7 fathoms at 2 miles westward of Khantaak Island to 167 fathoms near Point Latouche. Outside of a line between Ocean Cape and Point Manby, at a distance of 2 to 3 miles, there is a submarine ridge, with depths of 8½ to 16 fathoms. This ridge is very narrow on top, and the water deepens rapidly to over 30 fathoms on either side except near Point Manby. Near Ocean Cape the ridge curves northeastward and joins the shoaler water extending from the cape.

Ocean Cape, the eastern point at the entrance to Yakutat Bay, is low, well wooded, and marked by a light. Three bare, light-colored bluffs, from 50 to 70 feet high, the western one forming the point of the cape, are an unmistakable landmark for it. The 3-fathom curve is about ¼ mile offshore south of the cape, increasing to ½ mile on its west side. From Ocean Cape the shore trends northward for 1¼ miles to Point Carrew, where it bends sharply eastward into Monti Bay. The formation of the bottom off this point causes the line of breakers to appear well offshore even in fair weather.

On the south side of Ocean Cape the 10-fathom curve is about ¾ mile offshore, and from the soundings taken the water shoals regularly to the beach, where at low water a few rocks uncover about 250

yards from the beach. On the west side of Ocean Cape and Point Carrew the 10-fathom curve is nearly 1½ miles offshore. A sounding of 5 fathoms surrounded by deeper water is noted near the 10-fathom curve 1¼ miles west of Ocean Cape. The northwest extension of this shoal has depths of 7 to 8¾ fathoms, and its outer end lies 2 miles northwest of Point Carrew. The long and usually heavy ocean swell causes this shoal to be covered with a heavy swell and surf rollers, and makes the breakers appear to extend well offshore even in fair weather. The 3-fathom curve is found about ½ mile offshore west of Ocean Cape and Point Carrew.

Monti Bay has its entrance on the east side of Yakutat Bay, between Point Carrew and Khantaak Island, and 2 miles north of Ocean Cape. The bay is 1½ miles wide at its entrance, and extends about 2 miles east-southeastward and 1½ miles east-northeastward to Yakutat, where the bay turns north-northwest and is called Yakutat Roads, which is the anchorage used by vessels. The depths in Monti Bay are 21 to 40 fathoms, and the south side from Point Carrew to the head of the bay is clear, but the Khantaak Island side is foul.

Ankau Creek has its entrance on the south side of Monti Bay, 1¼ miles east of Point Carrew. It is the outlet of an intricate system of shallow lagoons within the peninsula between Monti Bay and the ocean. A depth of 9 feet can be carried through the entrance near the east side.

Khantaak Island, 1½ miles north of Point Carrew, is about 5 miles long; at its south end it is 1¾ miles wide from **Point Munoz** to Point Turner. The island is low and wooded, except **Point Turner**, which is a tongue of sand covered with grass and bushes and is a good mark. Off the northern end of the island a ledge extends 1½ miles in a northwesterly direction.

A bowlder ledge extends nearly ½ mile off Point Munoz, with a depth of 4½ fathoms near its end; the 3-fathom curve is about ¼ mile from shore. A reef extends nearly ¼ mile off the south side of the spit ending in Point Turner, and drops off quickly from the 3-fathom curve into 30 fathoms; it is marked by a buoy off its south side. In ordinary weather the breakers along this shore is a sufficient guide.

Southeast Shoal lies about midway between Point Turner and the south end of Yakutat village and is marked by a buoy off its southeasterly side. It uncovers about 2 hours after high water, and except at highest tides a few of the larger stones at the southwest portion show above water. At low water the bare shoal is about 200 yards in extent. At a distance of ¼ mile north-northwestward of the center of the shoal are two rocks awash at lowest tides; there is 2 to 3 fathoms between the shoal and rocks.

Yakutat is a post office with a sawmill on the north side of the eastern end of Monti Bay and on the east side of Yakutat Roads. There is a mission school and dwellings, a small native village, and a store. At ⅜ mile eastward of the mission is a cannery and wharf with 17 feet at its end. Some of the mail steamers call at Yakutat.

The shore at the mission and village should not be approached closer than 100 yards. The cove north of the village is nearly all bare at low water. The 10-fathom curve is about 140 yards from the 3-fathom curve in the entrance of the cove.

Yakutat Roads lies between Yakutat and the shoals extending from the southeast end of Khantaak Island. It has a clear width of ⅜ mile, a length of nearly 1 mile, depths of 5 to 25 fathoms, muddy bottom, and anchorage can be made in almost any part of it. The best anchorage for large vessels is in 22 to 23 fathoms with the point at the north end of the village bearing 141° true (ESE ¼ E mag.) distant 700 yards, and Point Turner 250° true (SW ½ S mag.). Smaller vessels can anchor closer in off the middle of the shoal cove north of the village in as little as 10 fathoms, but care must be taken not to anchor in a less depth. Anchorage may also be made at the head of Monti Bay below the cannery in 20 to 25 fathoms, muddy bottom.

Yakutat Roads at its north end connects with a number of bays and arms, which separate the numerous islands and rocks east of Khantaak Island. The channels are not navigable at low water except for small craft, though the inclosed bodies of water have depths from 20 to over 100 fathoms.

Port Mulgrave is suitable only for small craft with local knowledge. It is ¾ mile long and 200 yards wide, and its north side is formed by Village and Middle Shoals. Its entrance is close to the north side of Point Turner, between it and Middle Shoal, and is 60 feet wide and 16 feet deep. **Middle Shoal** shows at one-quarter ebb; parts of **Village Shoal** show at high water.

Rurik Harbor is a narrow shallow indentation in Khantaak Island north of Village Shoal with depths of 9 to 15 fathoms in its entrance. Small vessels can anchor here, but should not go above the south point at the entrance. Its entrance is from Yakutat Roads north of Southeast Shoal. **Prince Shoal**, partly bare at low water, extends ⅜ mile east-southeastward from the north point at the entrance.

Point Manby, the western point at the entrance to Yakutat Bay, is low and wooded. There is usually a heavy surf on the beach, rendering it dangerous for boats to land. The great Malaspina Glacier descends to within about 4 miles of Point Manby.

Disenchantment Bay, from Point Latouche, continues northward for about 10 miles to Hubbard Glacier. **Russell Fiord** is an arm extending 28 miles southeastward from the head of Disenchantment Bay. **Nunatak Fiord** extends 7 miles northeastward from Russell Fiord at 10 miles above Disenchantment Bay. The shores of these arms are surveyed, but no sounding has been done. From Point Latouche to Nunatak Fiord there is much ice. The only known dangers are on the east side between Haenke and Osier Islands.

Just north of Point Latouche, temporary anchorage in 20 fathoms is reported about 400 yards off the sand beach. Heavy ice will probably be troublesome at times.

Haenke Island lies about 4½ miles northward of Point Latouche; an anchorage in 6 fathoms is reported inside of it.

Northward of Haenke Island there are reported to be a number of reefs, some of which show at some stage of the tide; the exact positions of the reefs are not known, but their approximate positions are indicated on chart 8455. It is very probable that there are other reefs in this vicinity which are not even indicated on the chart.

Osier Island is close to the turning point from Disenchantment Bay into Russell Fiord. The water is shoal inside it, and a rock awash at high water lies about 100 yards off its northwest end.

Ice.—The ice in Yakutat Bay comes from Turner and Hubbard Glaciers at the head of Disenchantment Bay and from Nunatak Glacier at the head of Nunatak Fiord. It is usually quite thick from Point Latouche to Nunatak Fiord, while at times it is scarce. Ordinarily it banks on the western shore of the bay as far south as Blizhni Point. Occasional pieces find their way as far south as Ocean Cape and Point Manby, and scattering pieces are usually found in the body of the bay.

DIRECTIONS, YAKUTAT BAY.

In approaching Yakutat Bay, mountains with numerous glaciers first appear in clear weather, and the low, wooded land near the coast will be made when within 10 to 12 miles of Ocean Cape. When approaching the entrance it is advisable to make Ocean Cape and use it as the landmark for entering the bay; it is marked by a flashing white light, visible 11 miles. In approaching Ocean Cape in thick weather the lead should be used until the cape is made, and the water should not be shoaled to less than about 35 fathoms, which depth is found about 2 miles offshore at the cape. There is a bar about ½ mile wide extending in a general east and west direction across the entrance to Yakutat Bay. The soundings on this bar show general depths of 8½ to 16 fathoms, deepening quickly to 30 fathoms on its north and south sides except on the Point Manby side of the bay, and it can be readily located by the use of the lead.

When Ocean Cape is made, shape the course to pass 2½ miles westward of it. With a smooth sea Ocean Cape and Point Carrew can be safely rounded at a distance of 2 miles. In thick weather caution is necessary when rounding Ocean Cape on account of the heavy swell and surf rollers, which often extend as far as 2 miles northwestward of Point Carrew. For courses approaching and entering Yakutat Bay, see table of courses, page 24.

APPENDIX.

COAST PILOTS OF THE COAST AND GEODETIC SURVEY.

	Price.
U. S. Coast Pilot, Atlantic Coast, Parts I–II, from St. Croix River to Cape Ann	$0.50
U. S. Coast Pilot, Atlantic Coast, Part III, from Cape Ann to Point Judith	.50
U. S. Coast Pilot, Atlantic Coast, Part IV, from Point Judith to New York, including Long Island Sound	.50
U. S. Coast Pilot, Atlantic Coast, Section C, Sandy Hook to Cape Henry, including Delaware and Chesapeake Bays	.50
U. S. Coast Pilot, Atlantic Coast, Section D, Cape Henry to Key West	.50
U. S. Coast Pilot, Atlantic Coast, Section E, Gulf of Mexico, from Key West to the Rio Grande	.50
Inside Route Pilot, coast of New Jersey	.20
Inside Route Pilot, New York to Key West	.20
Inside Route Pilot, Key West to New Orleans	.20
U. S. Coast Pilot, Pacific Coast, California, Oregon, and Washington	.50
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